

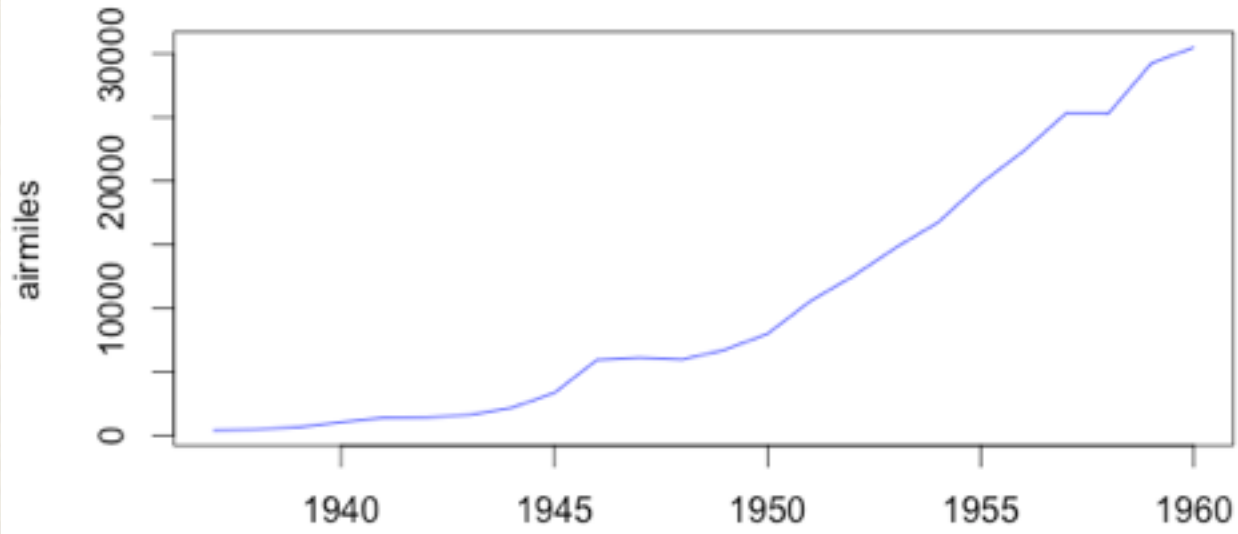
Multivariate visualization

C. Andrews

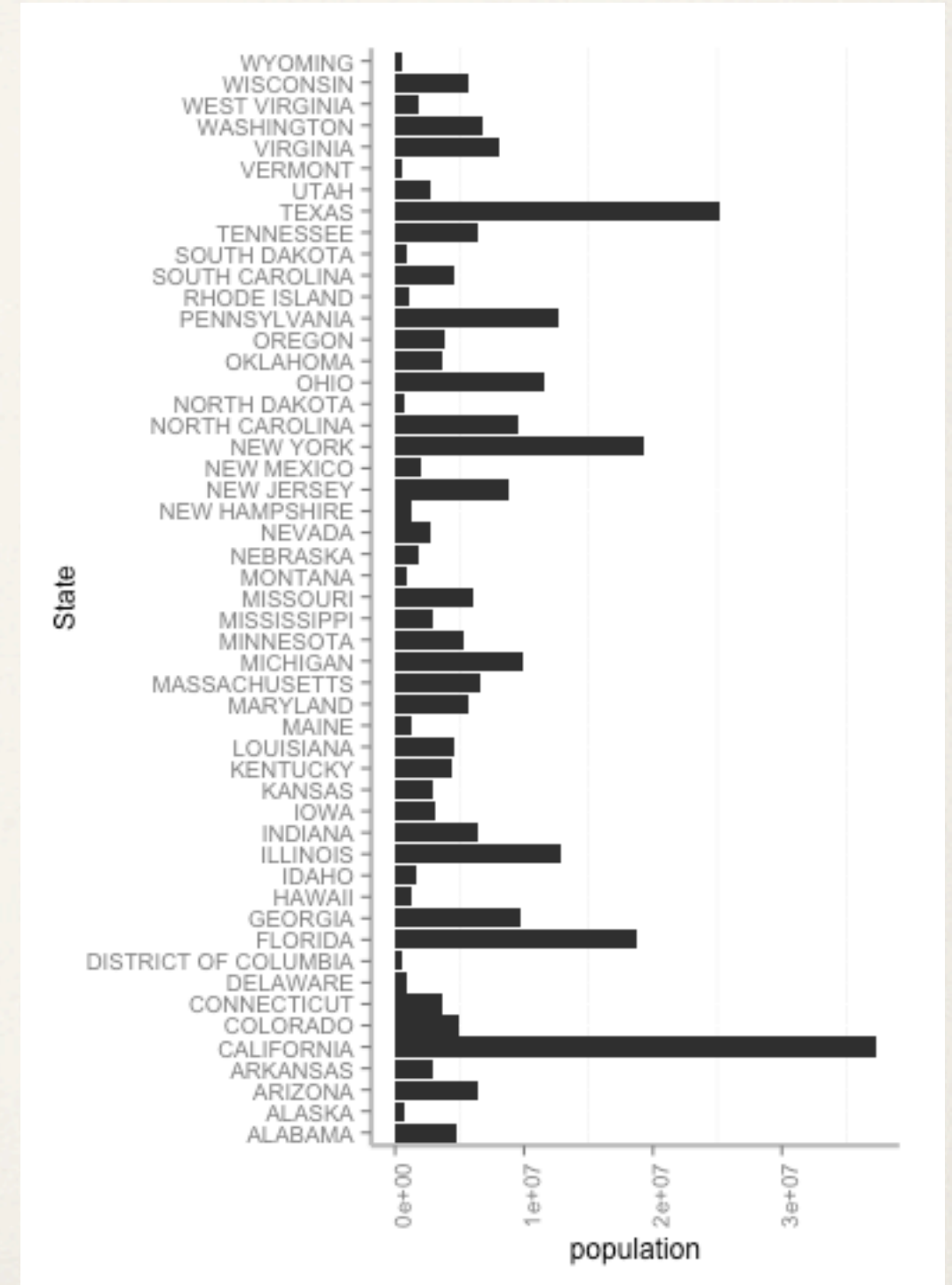
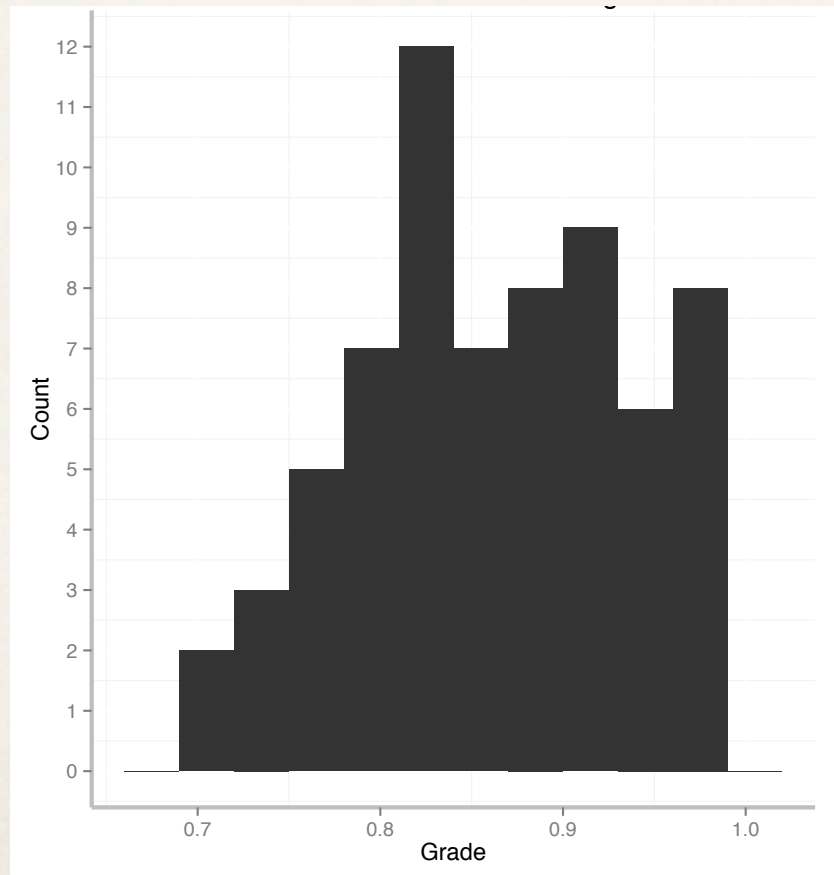
2014-04-01

Univariate

Air miles 1937-1960



Passenger-miles flown by U.S. commercial airlines



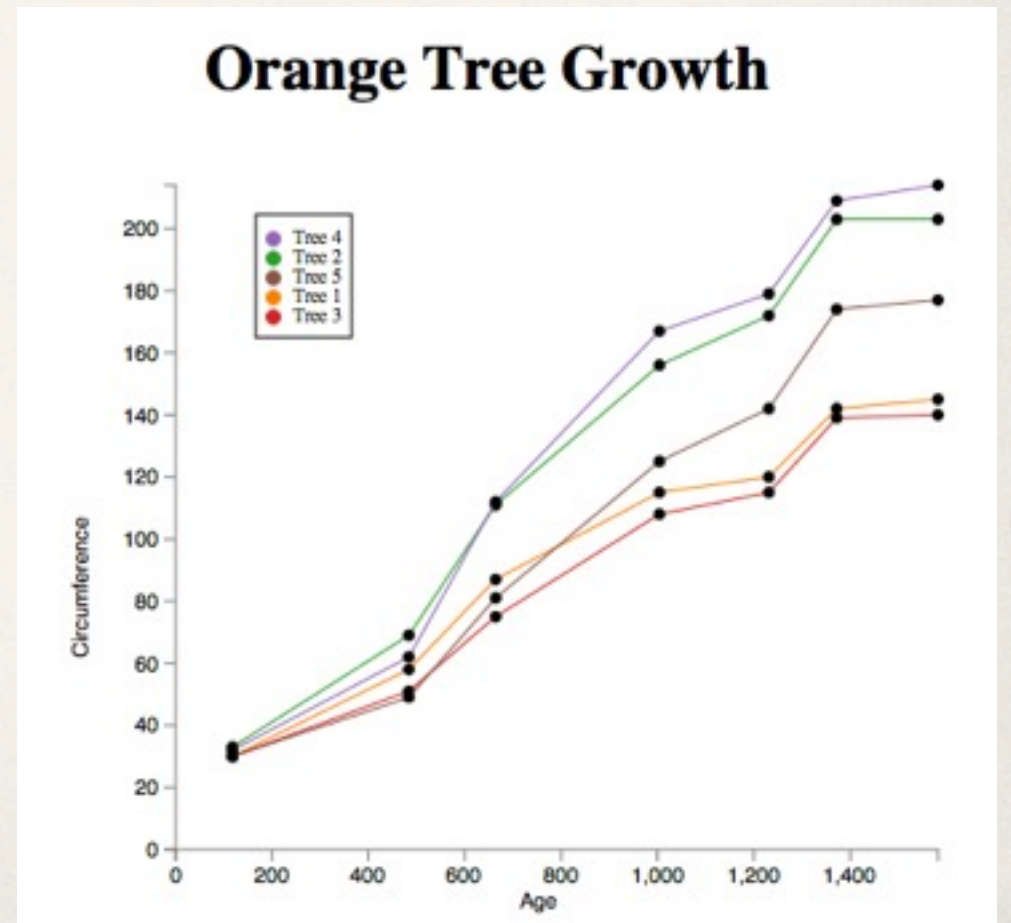
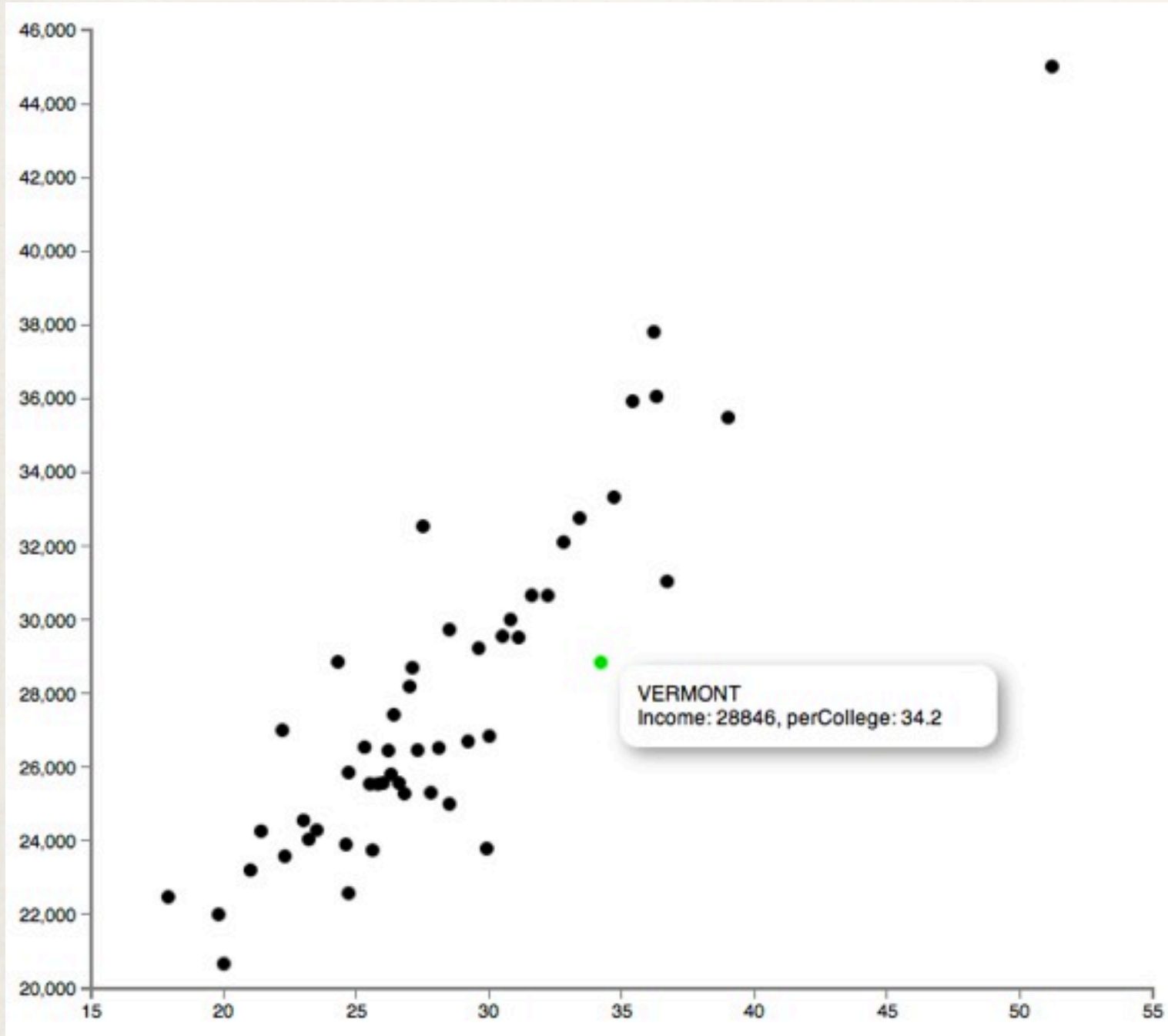
Multivariate questions

Which items are most alike?

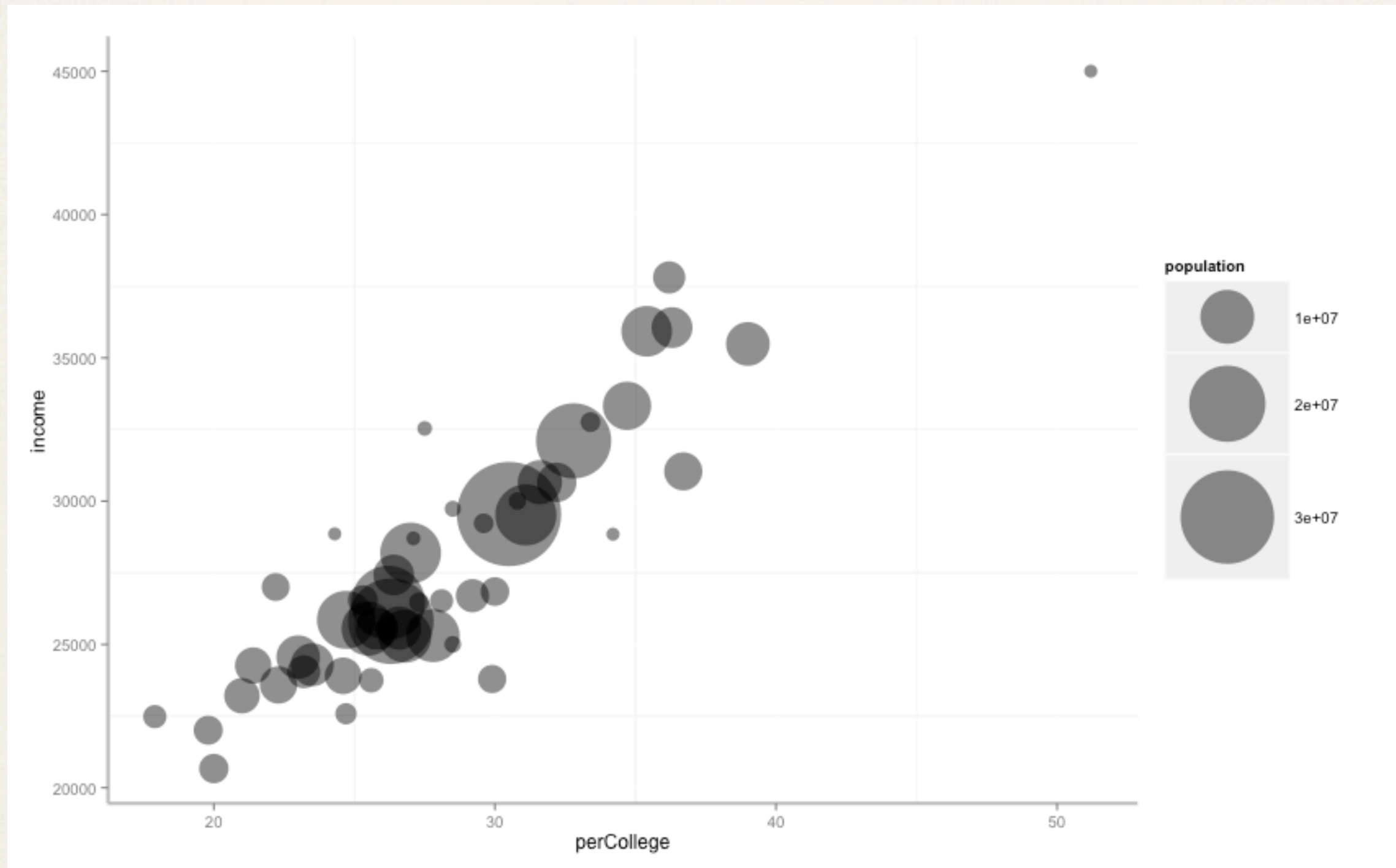
Which items are most exceptional?

How can these items be combined into logical groups based on similarity?

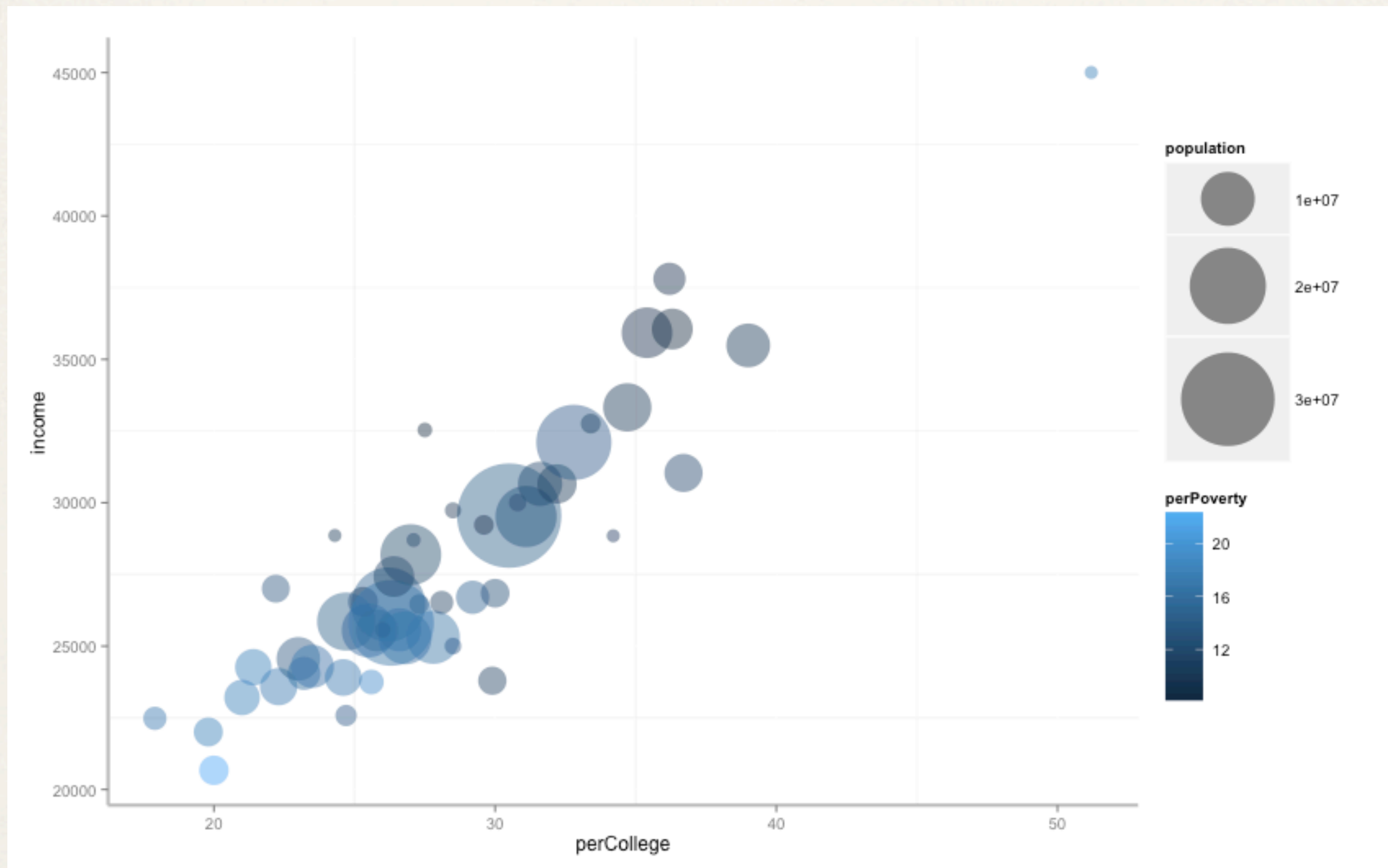
Bivariate



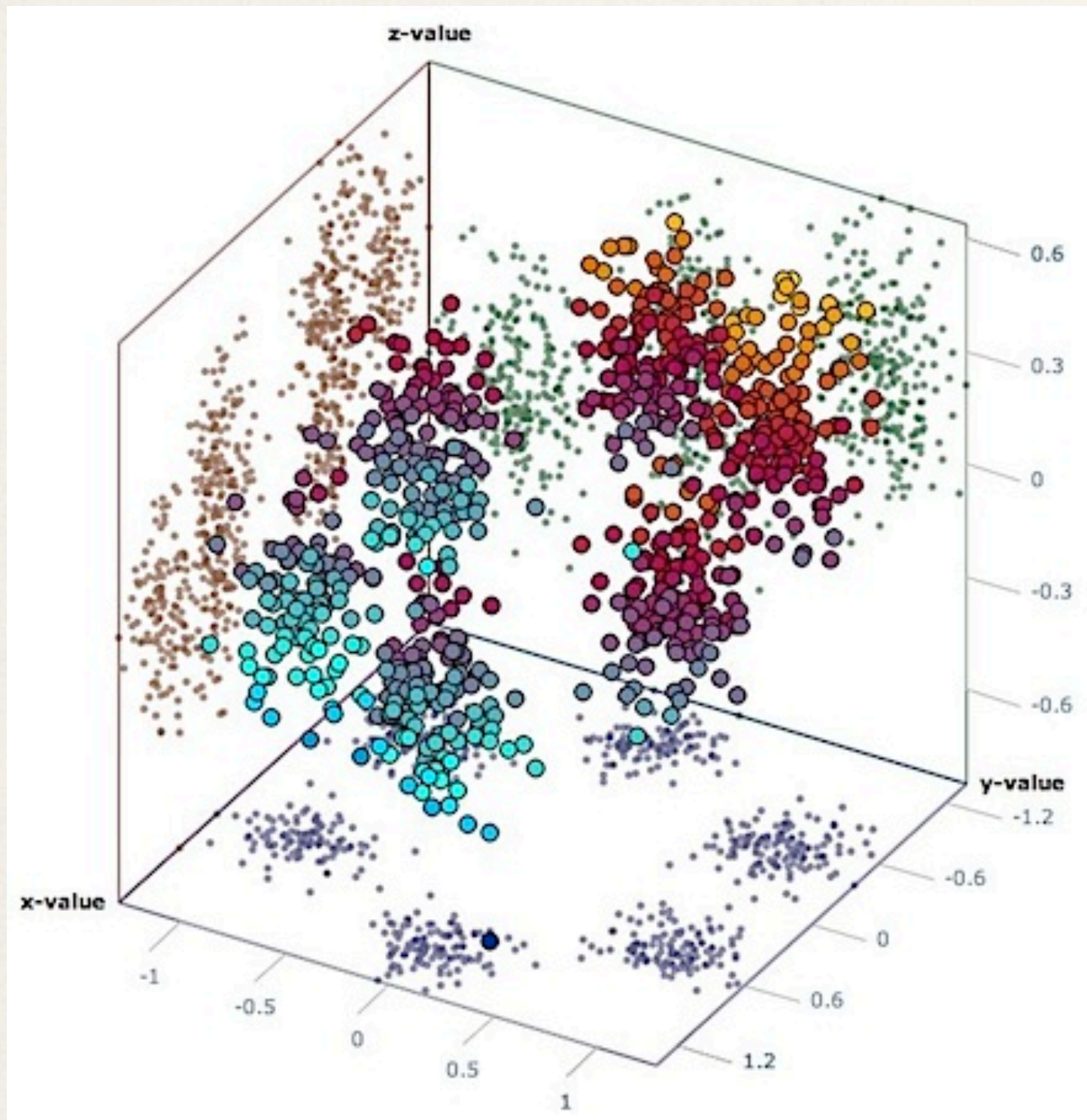
Trivariate



Hypervariate

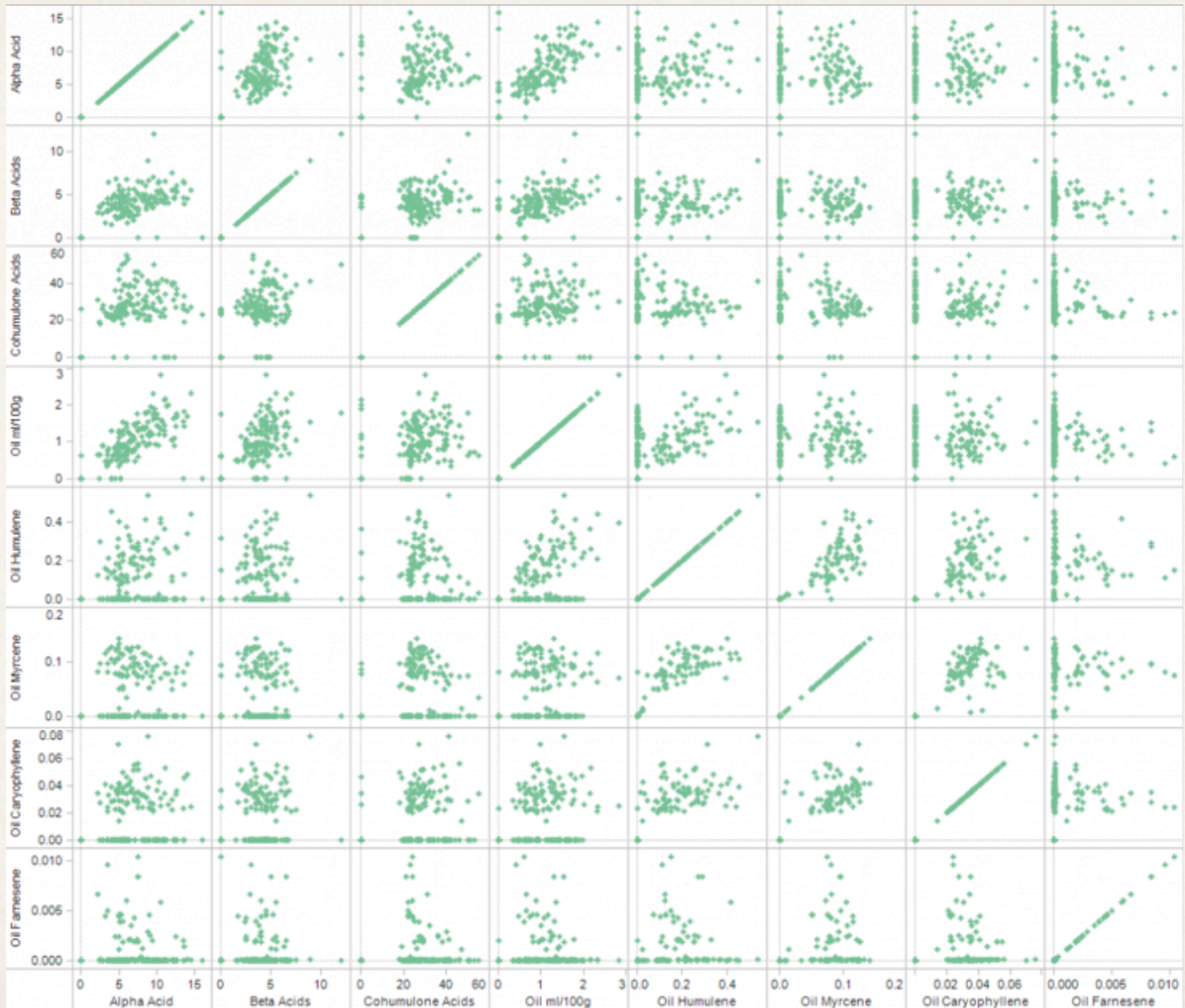


MultiD Scatterplots



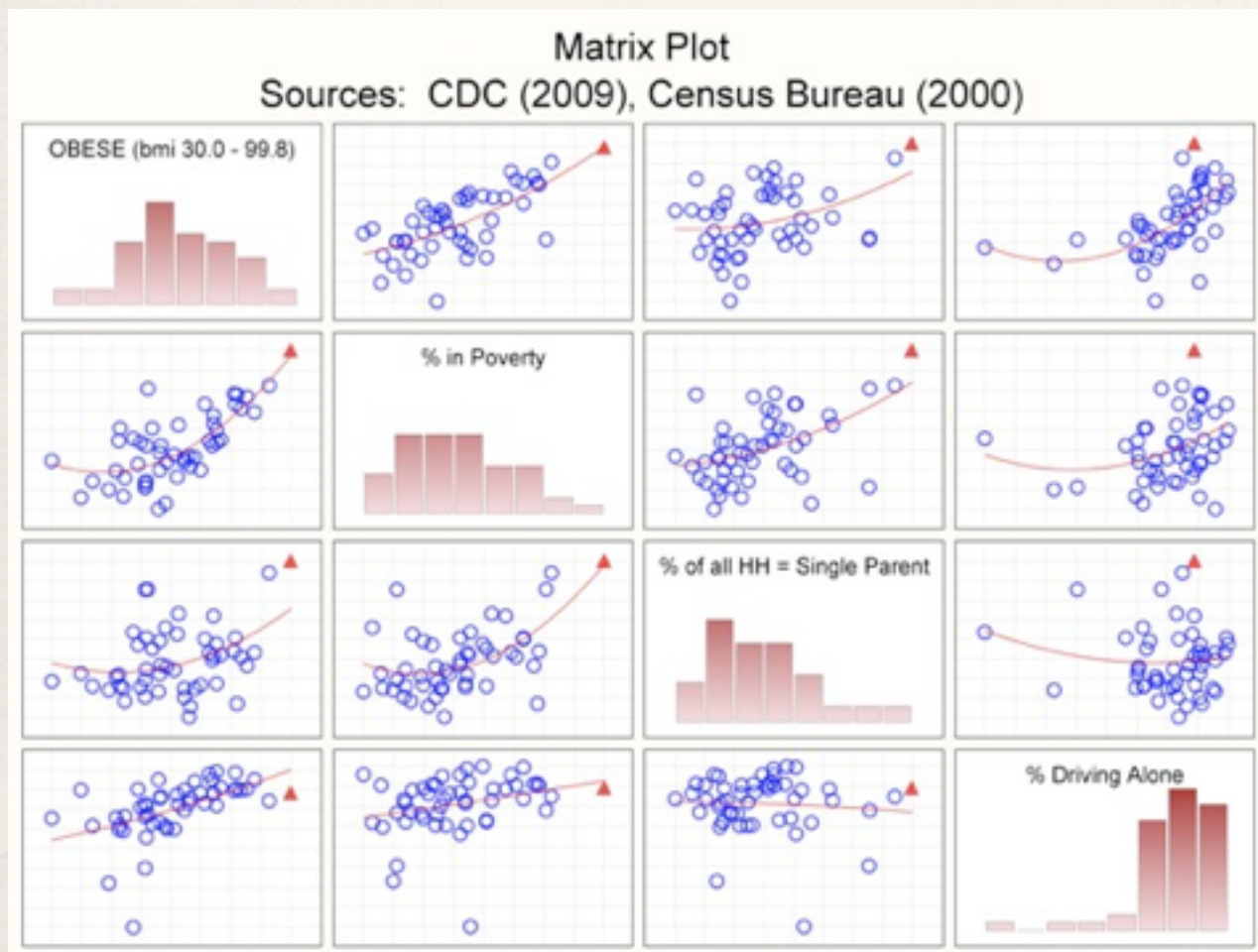
or just add another axis

Scatterplot matrix

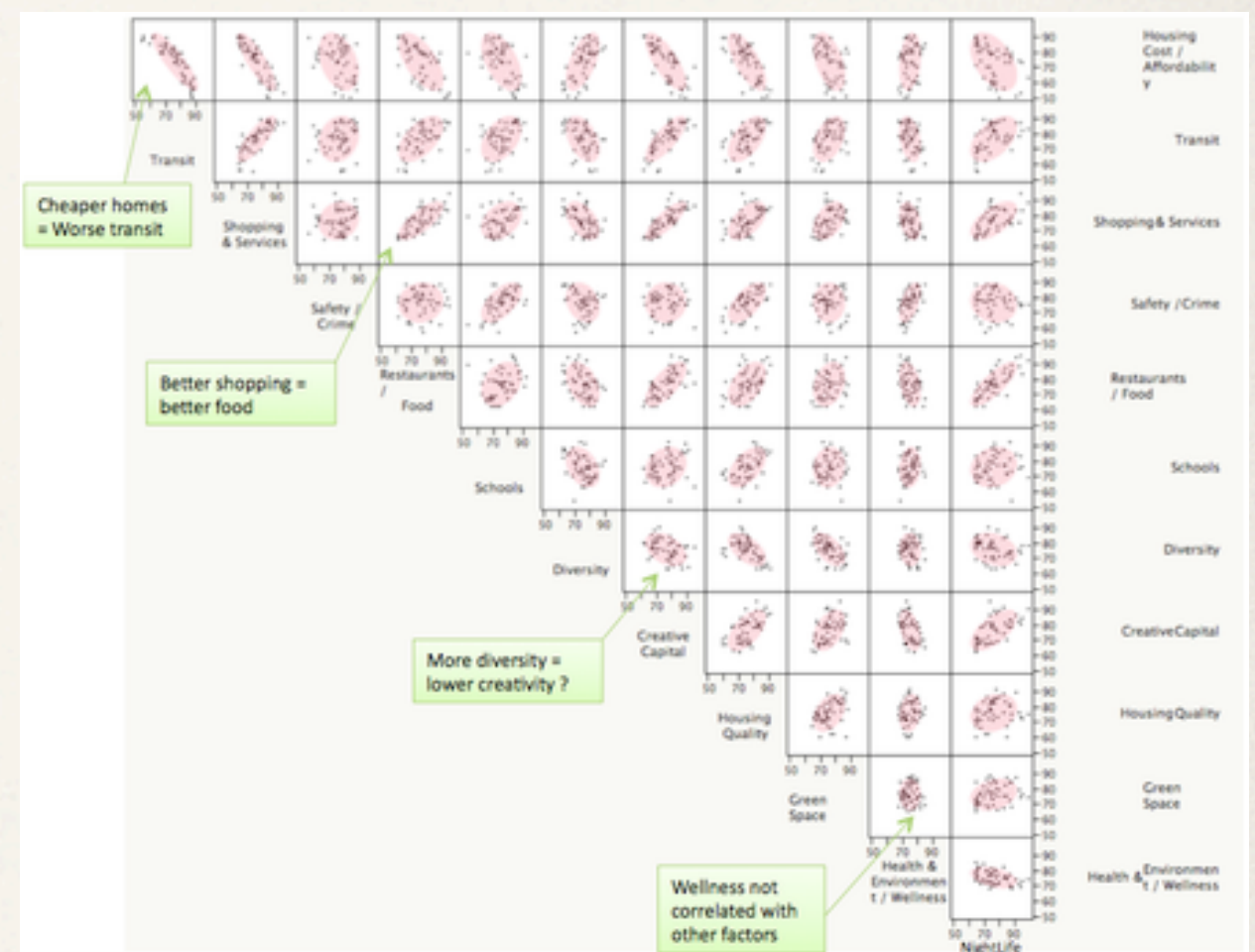


<http://ericksondata.com/wp/2012/150-varieties-of-hops/>

Scatterplot matrix

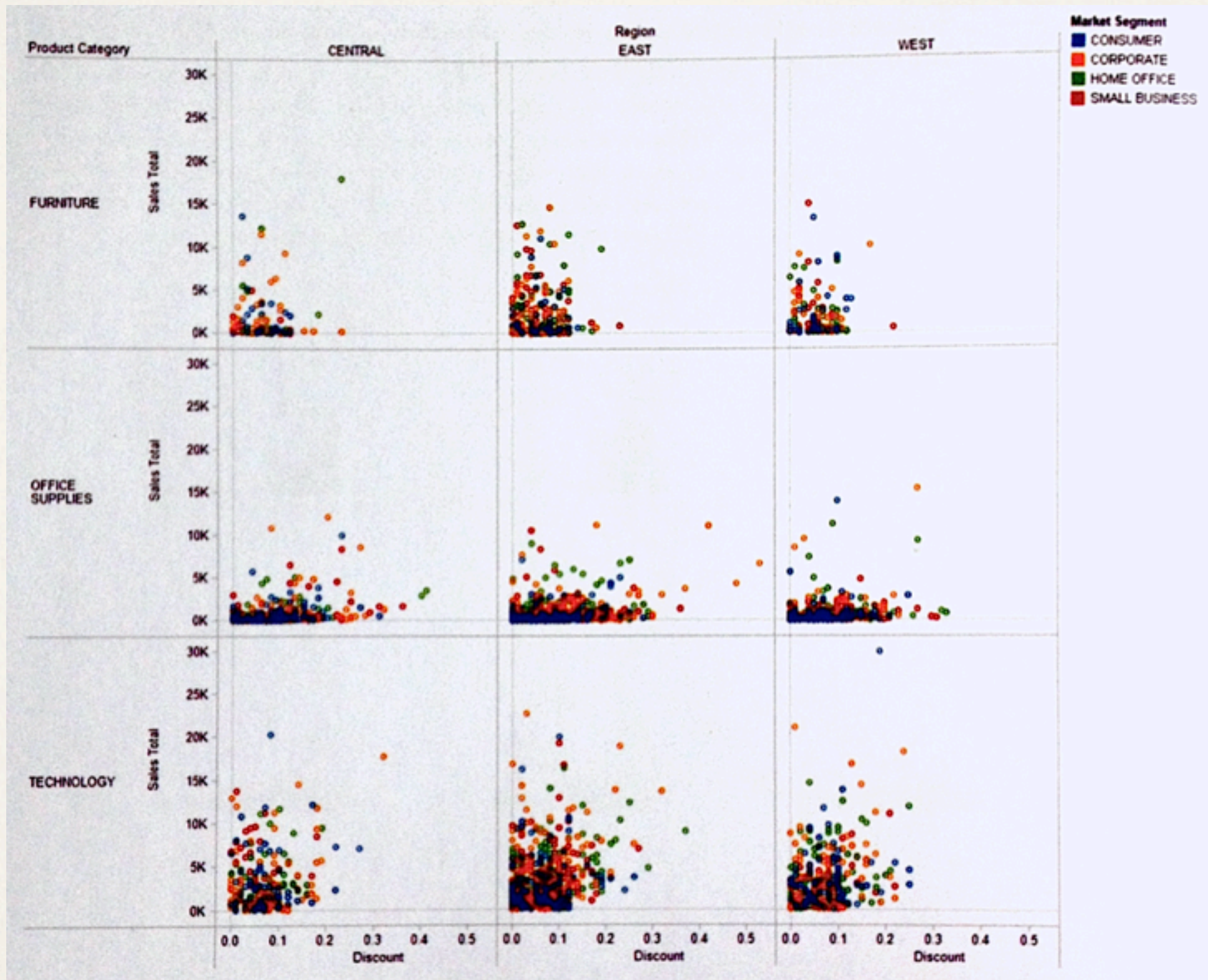


<http://www.statsoft.com/support/blog/entryid/212/finding-the-right-pieces-to-the-puzzle>



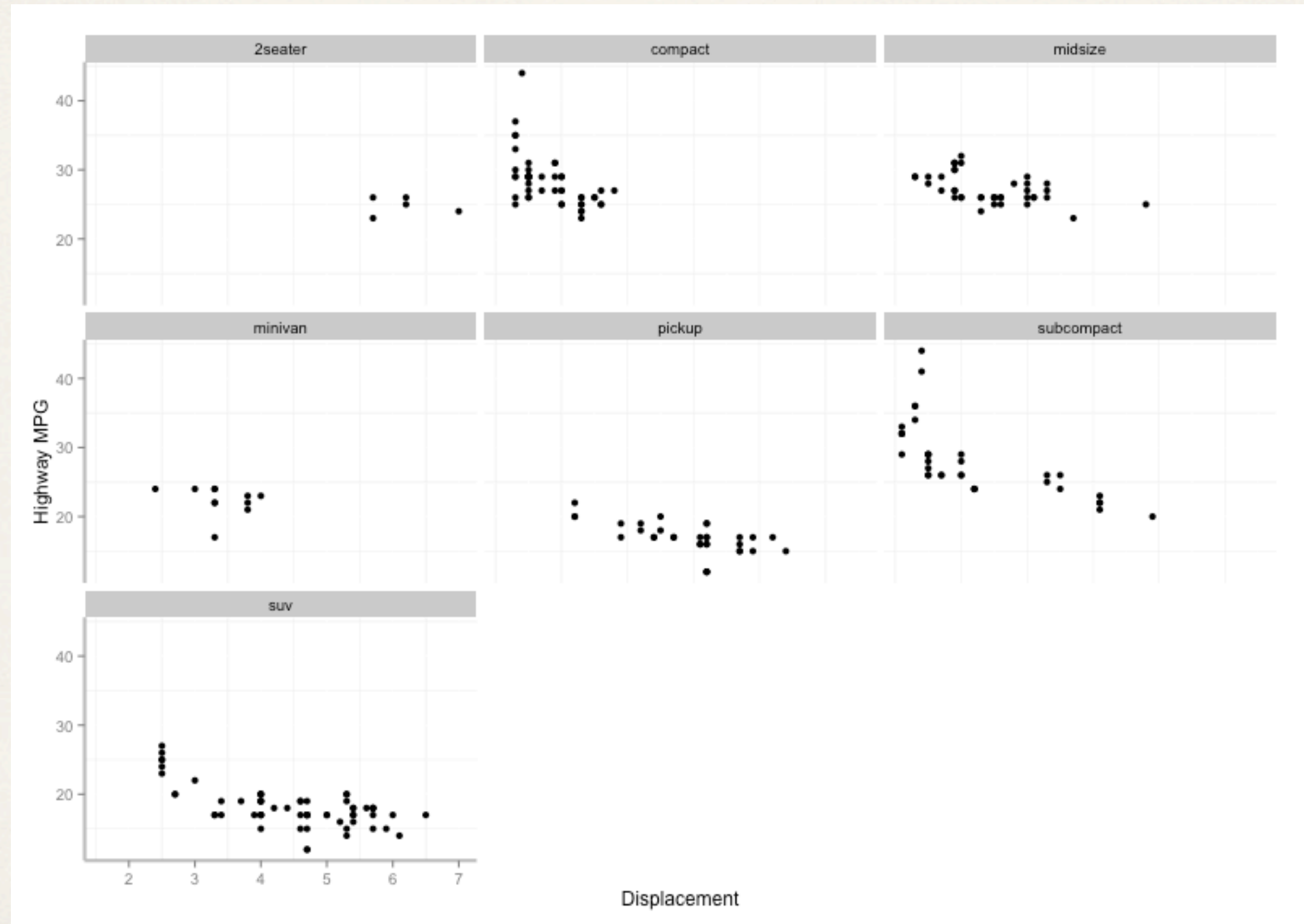
http://junkcharts.typepad.com/junk_charts/2010/06/the-scatterplot-matrix-a-great-tool.html

Trellis plot

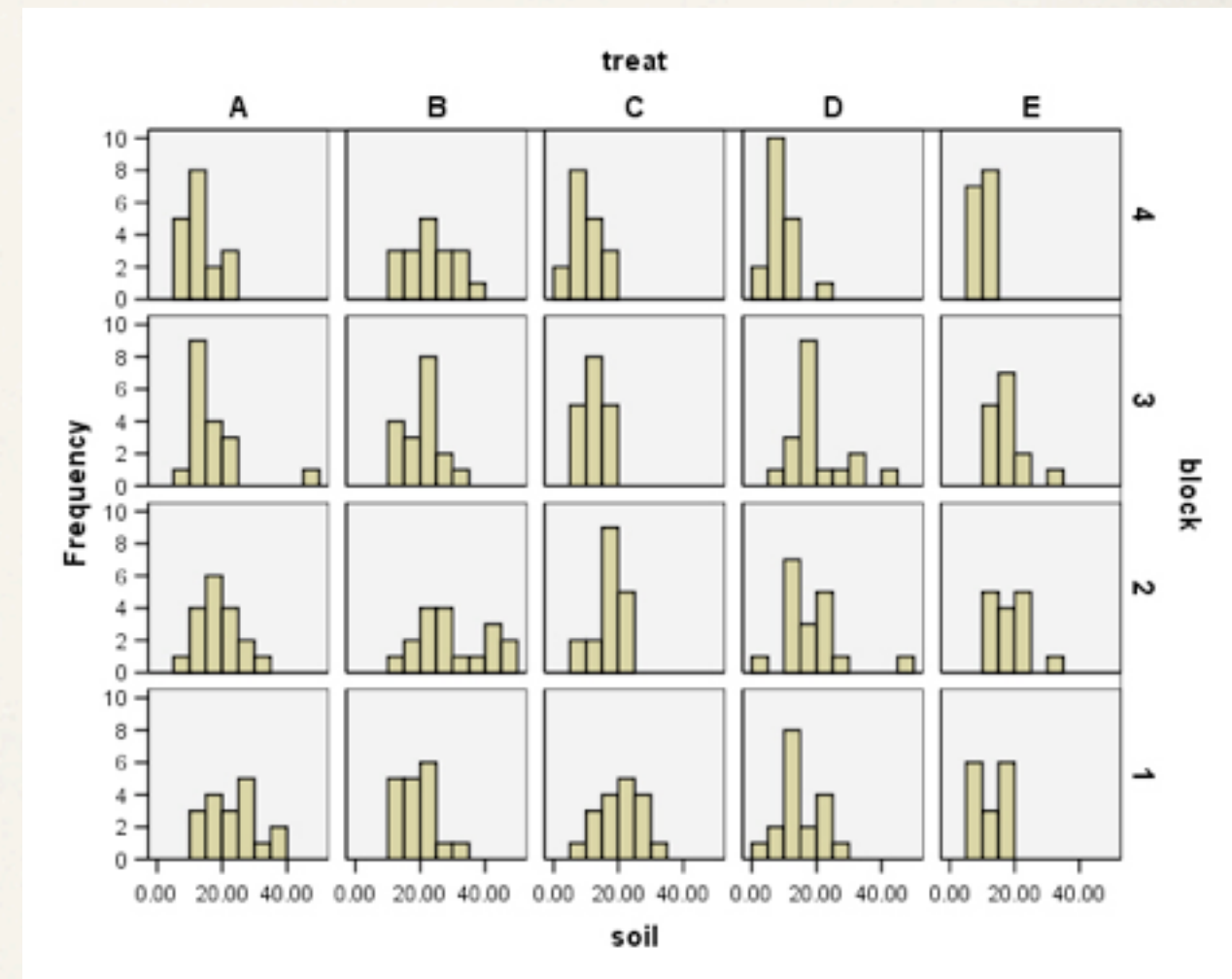
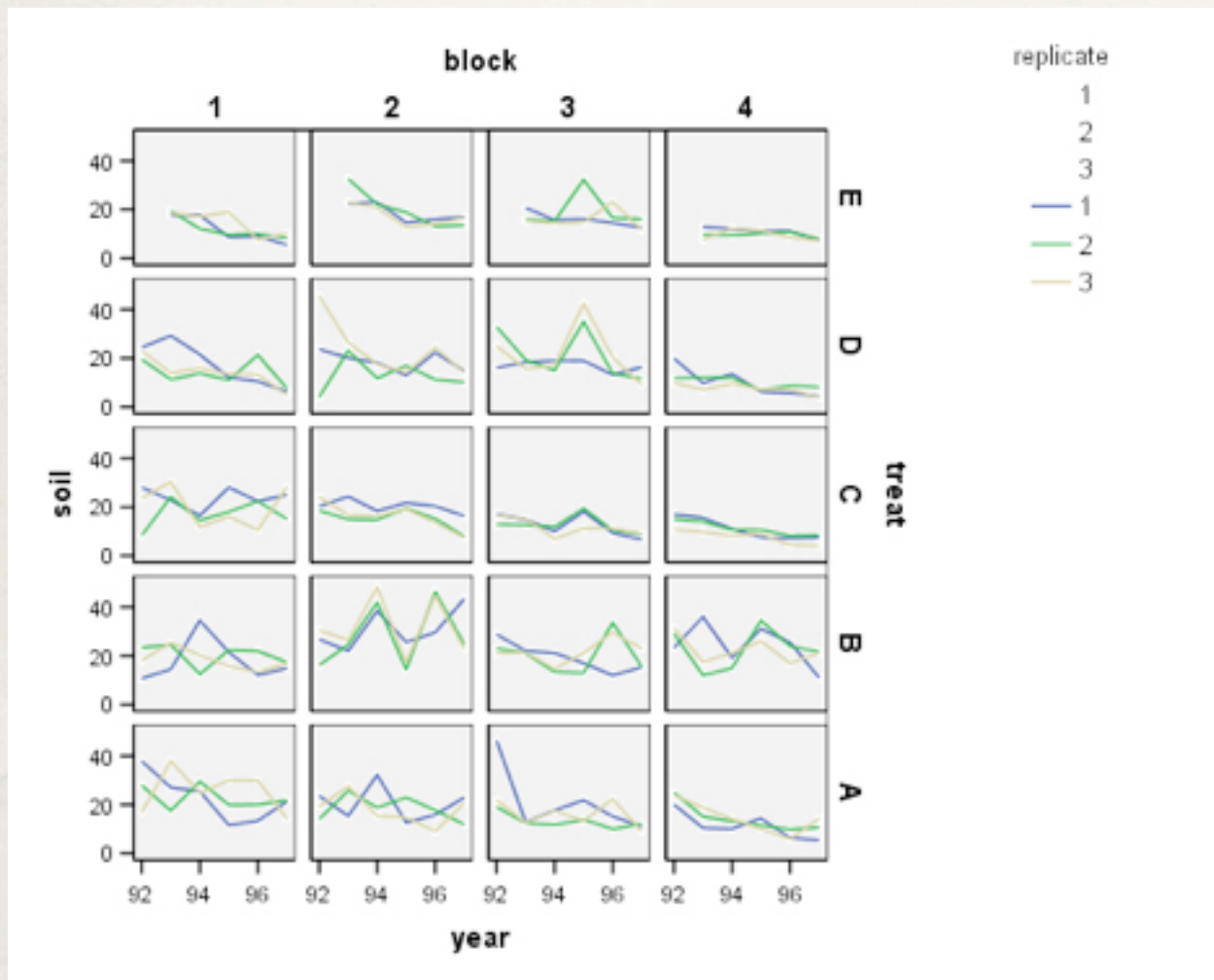


Few, "Now You See It"

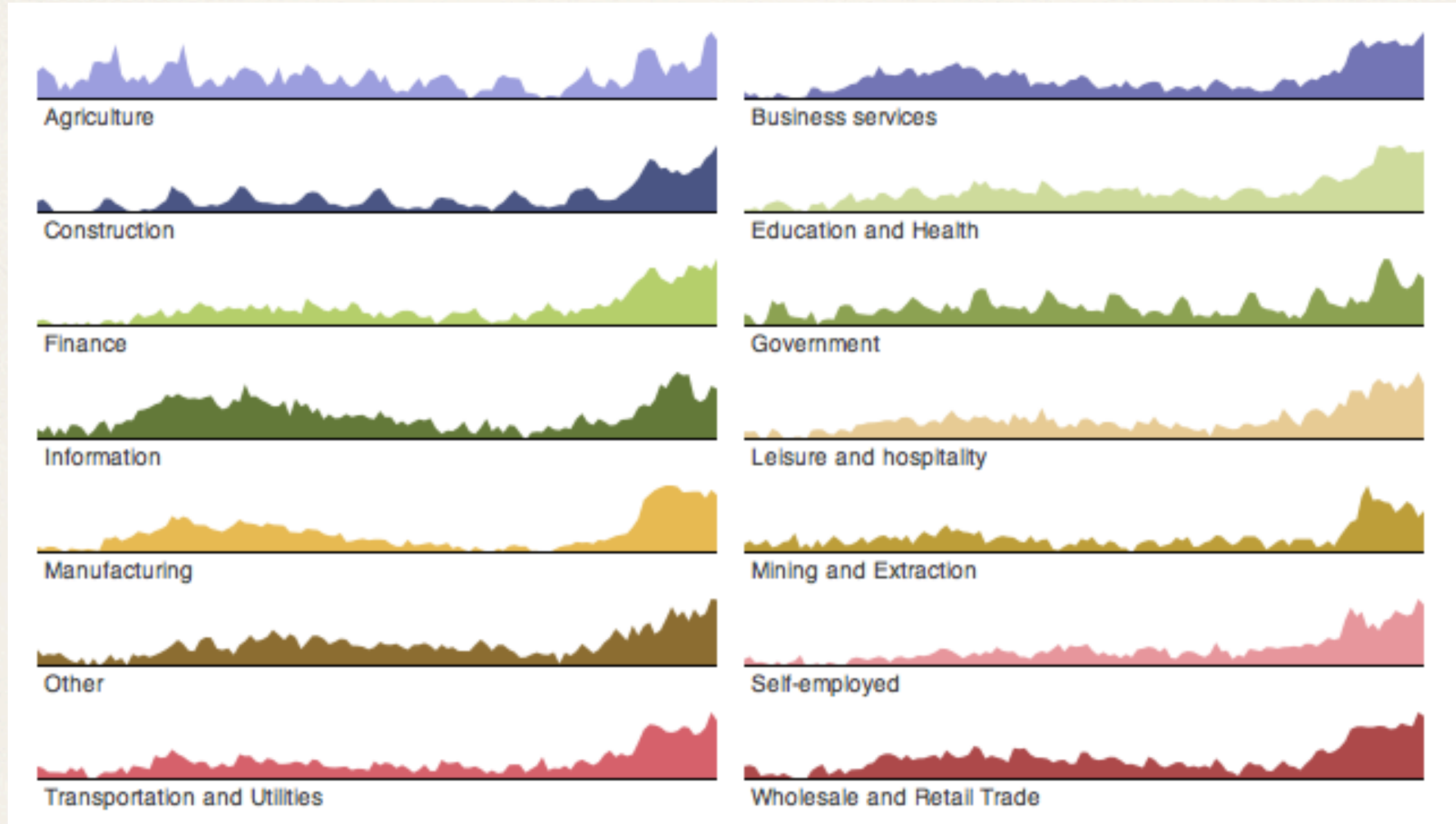
Trellis plot



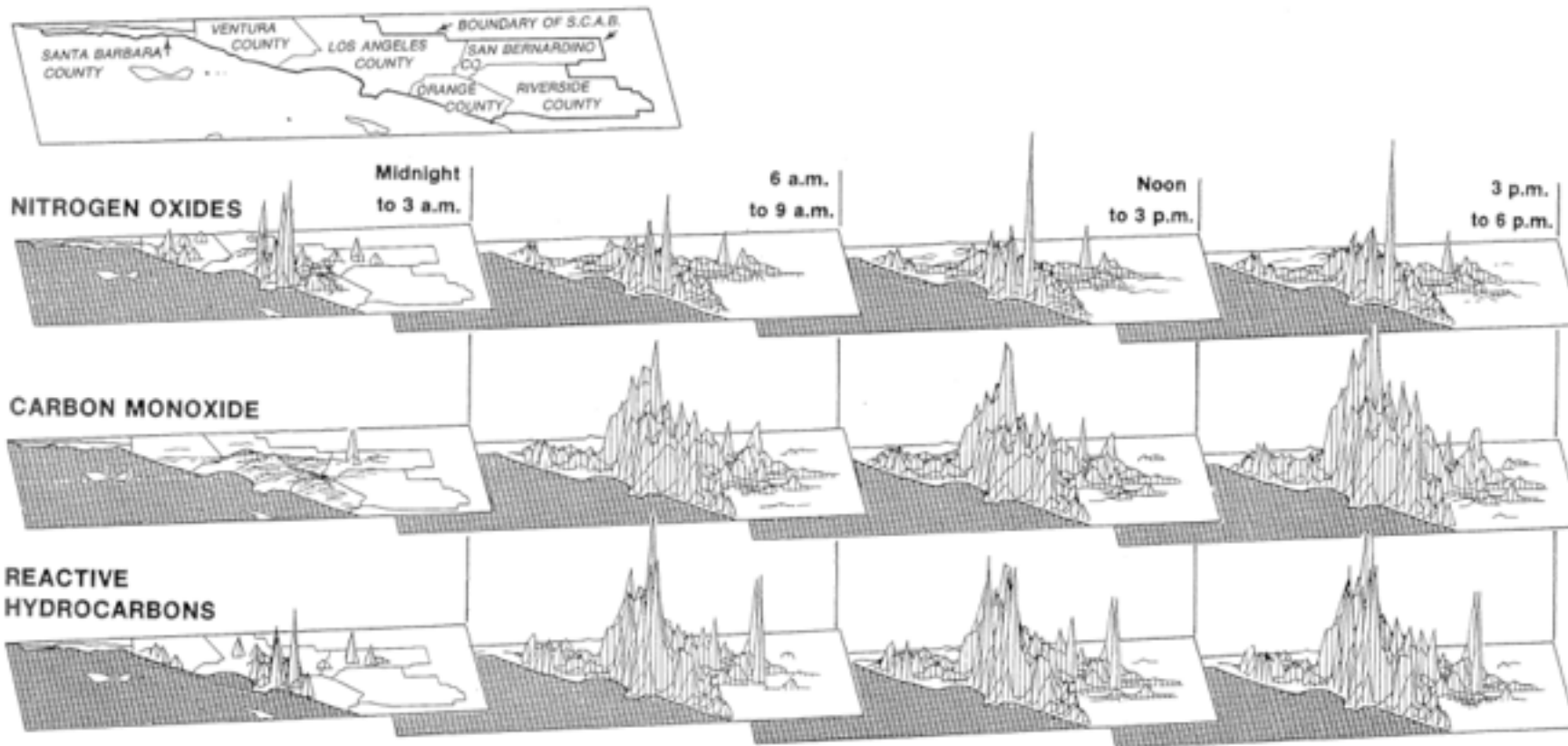
Trellis graph - not just scatterplots



Small multiples



Small multiples



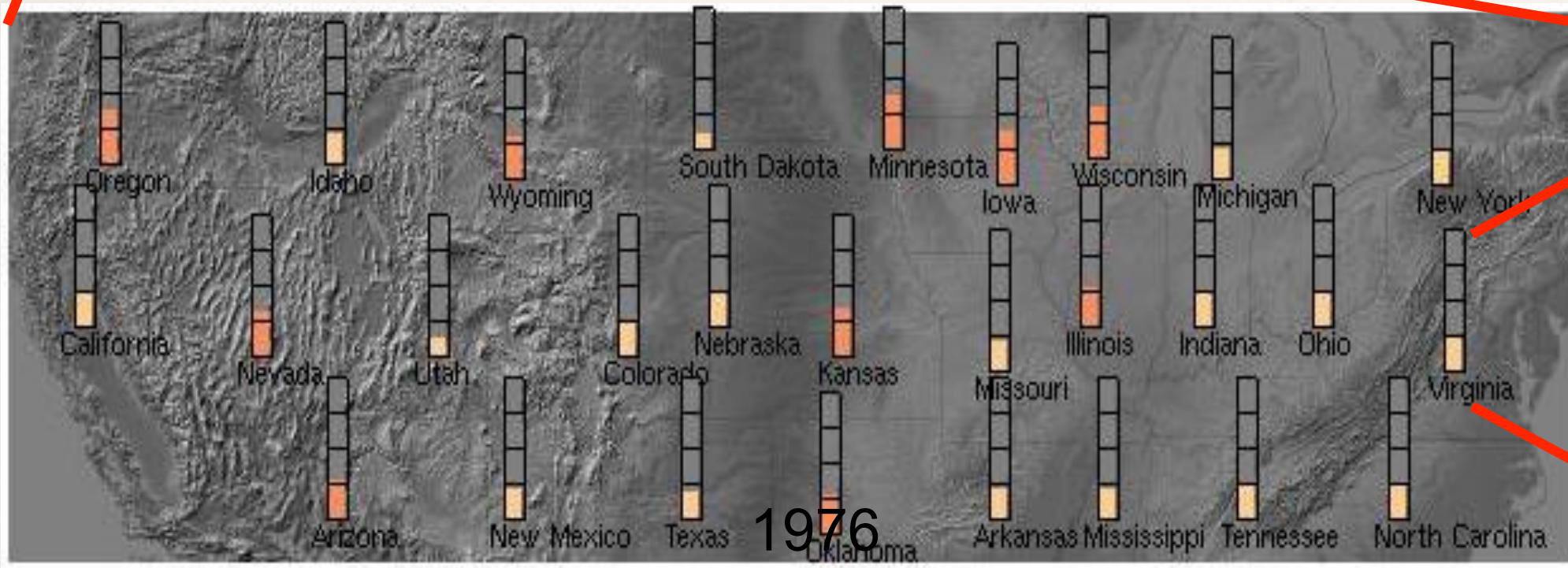
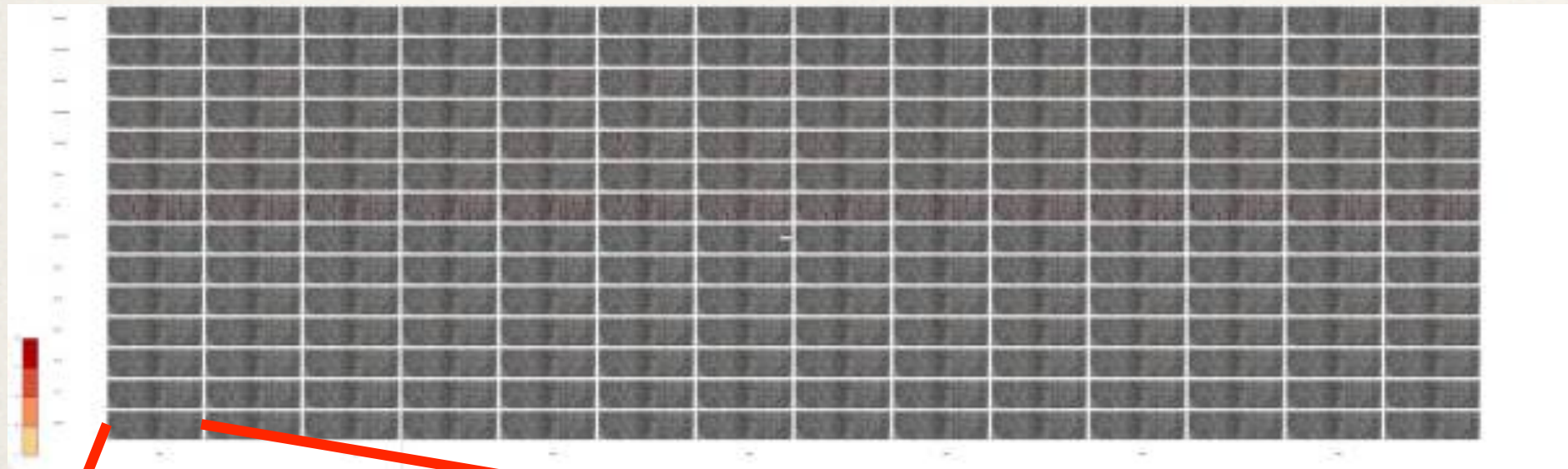
Tufte. The Visual Display of Quantitative Information

Chaiyya Chaiyya Dance Moves

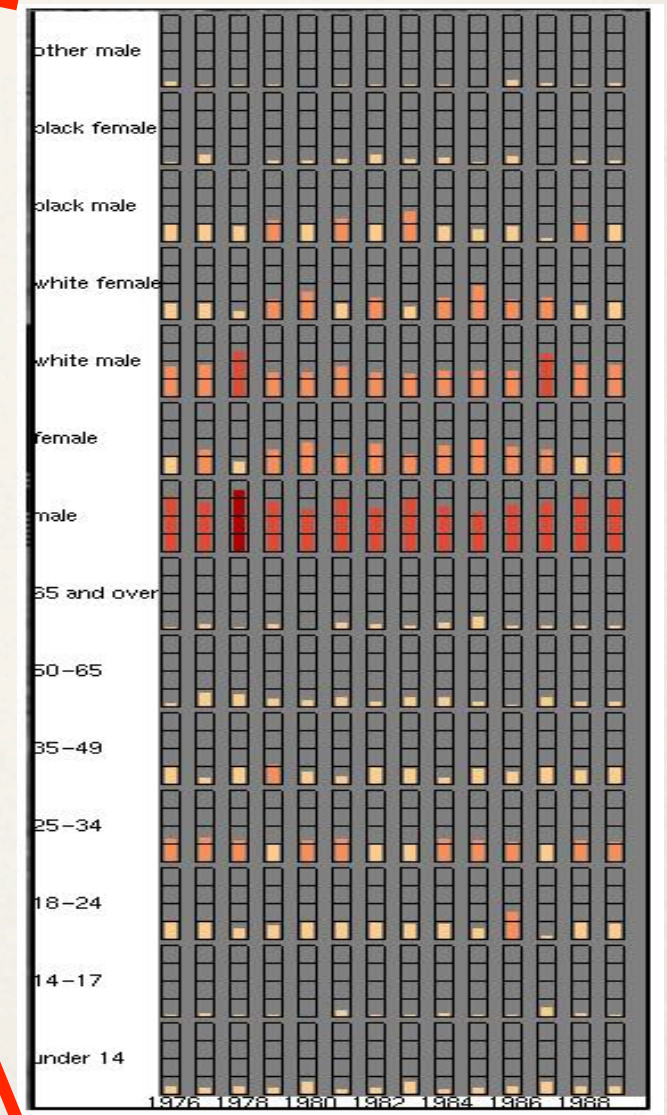
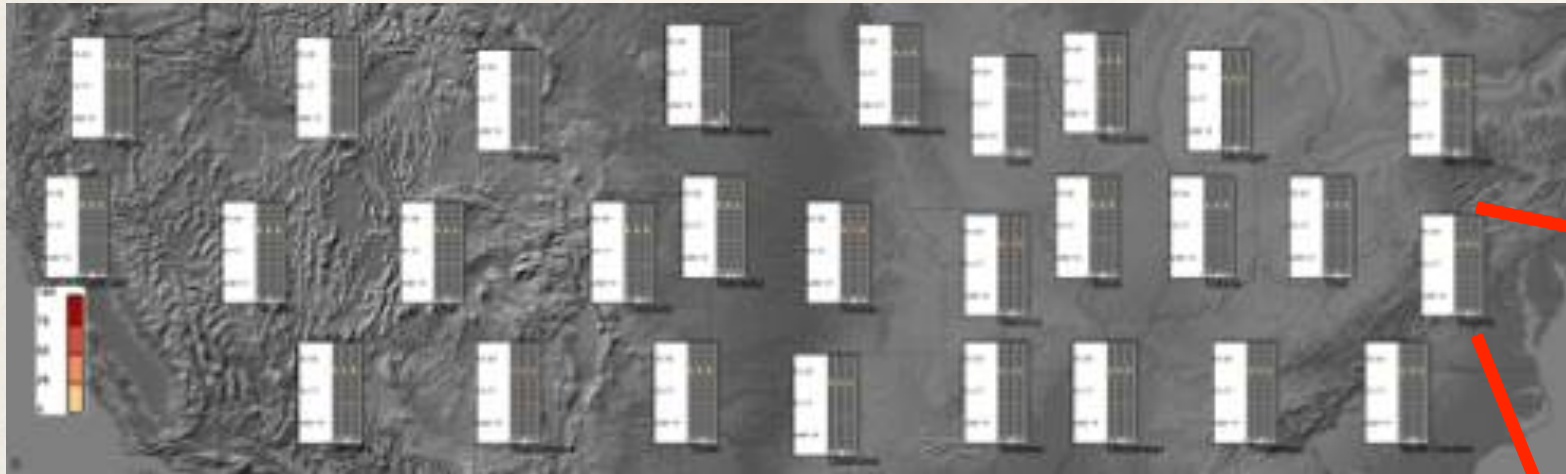


<http://jeffreymilanetti.wordpress.com/2012/11/>

Small multiples



Embedded visualization



Multidimensional scaling

Calculate the similarity of all pairs of records using some distance function

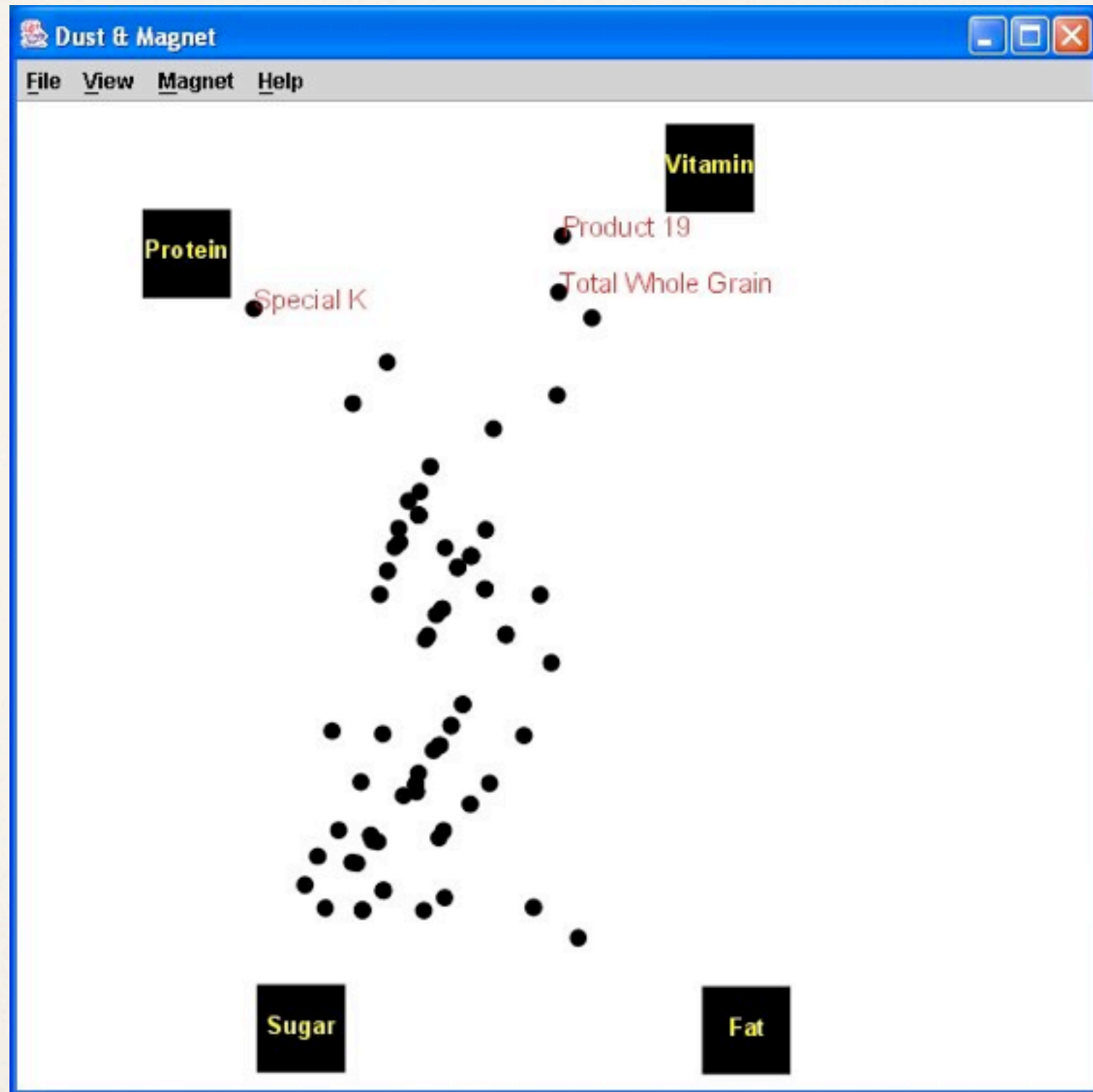
Create a map that maps each record into our 2 (or 3) dimensional space

Calculate the similarity of all pairs of points

Compute the stress on the system as function of the difference between the similarity of the points and the similarity of the original records

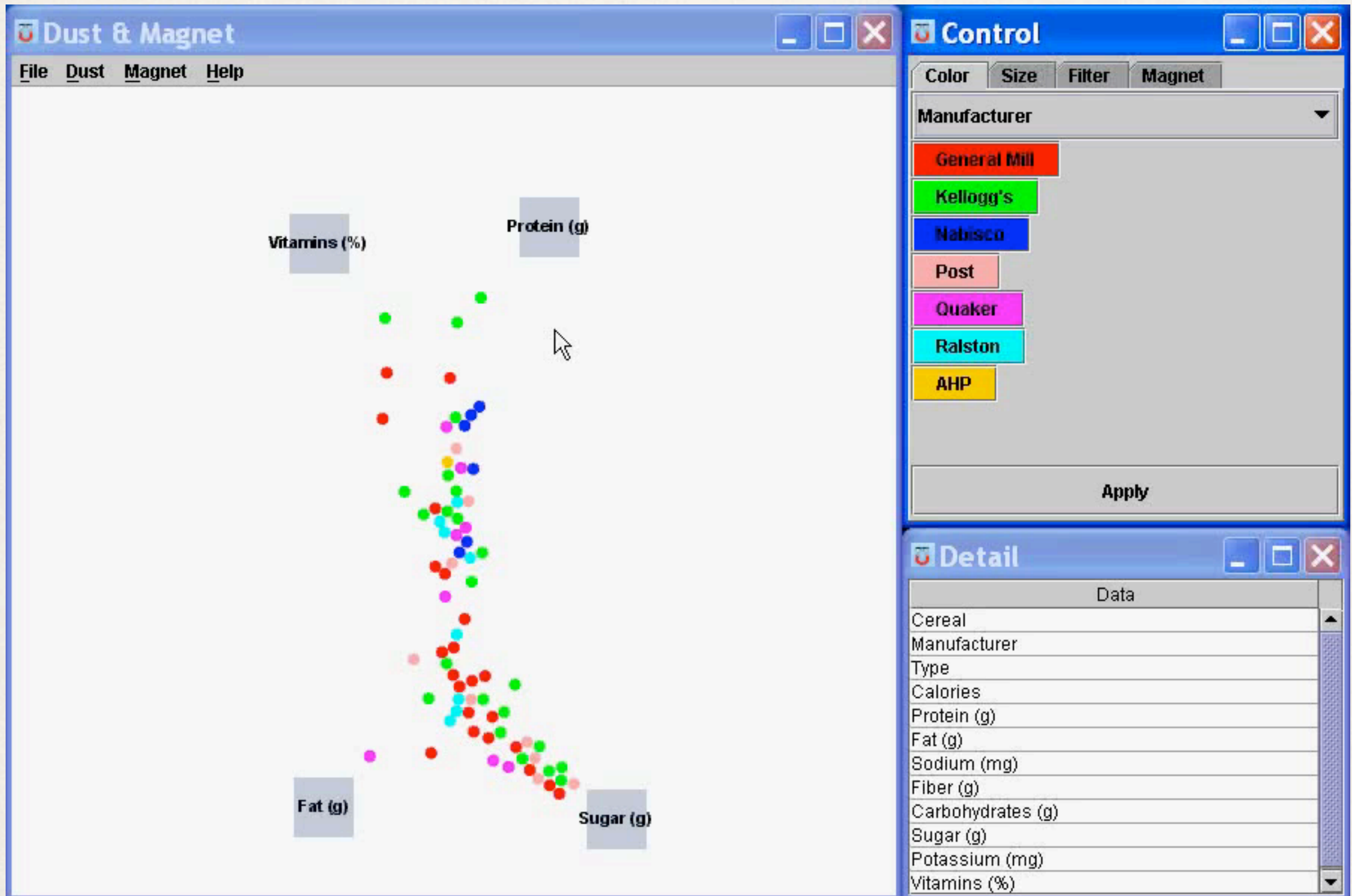
If the stress is above some threshold, move points to reduce stress and repeat

Dust & Magnet



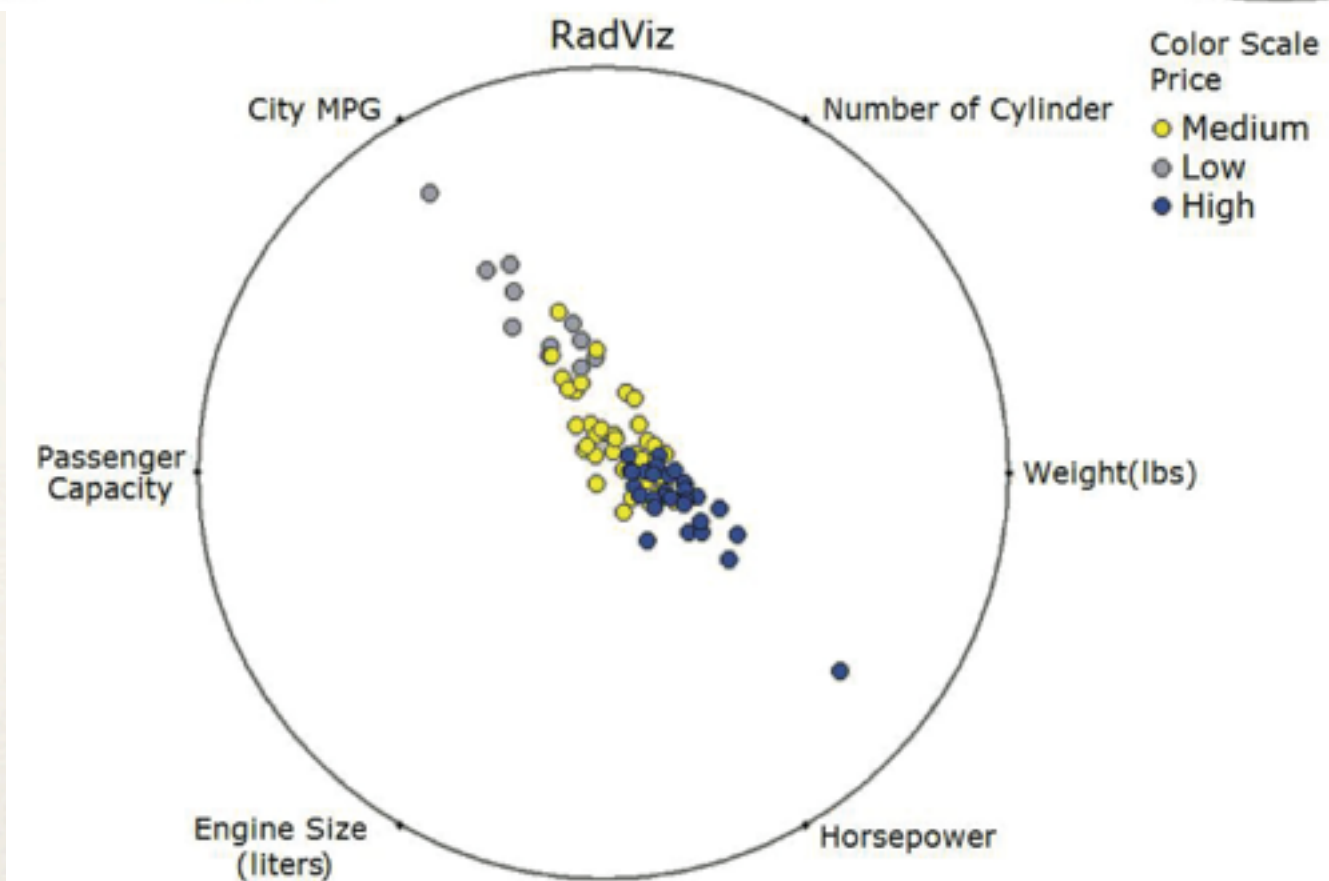
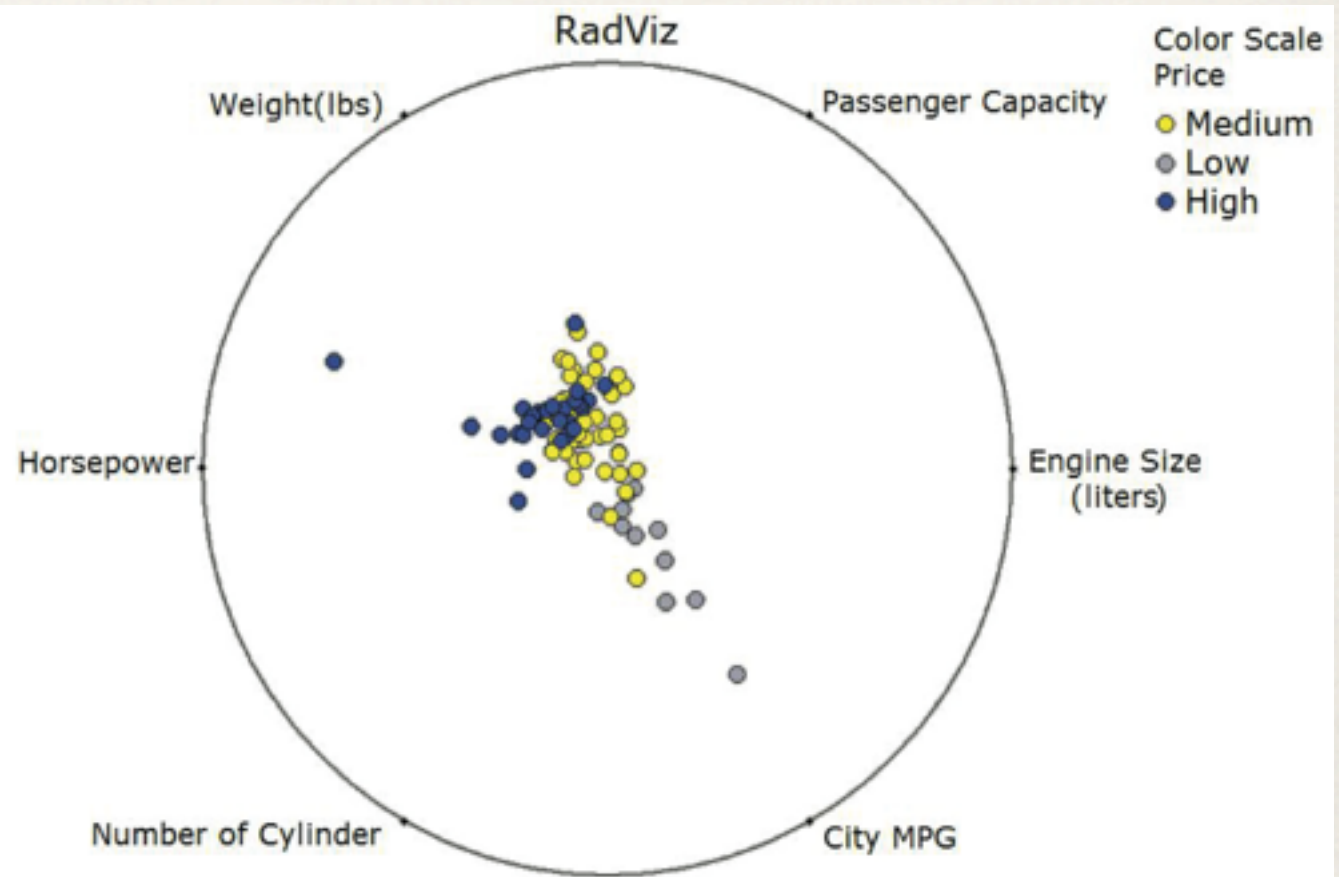
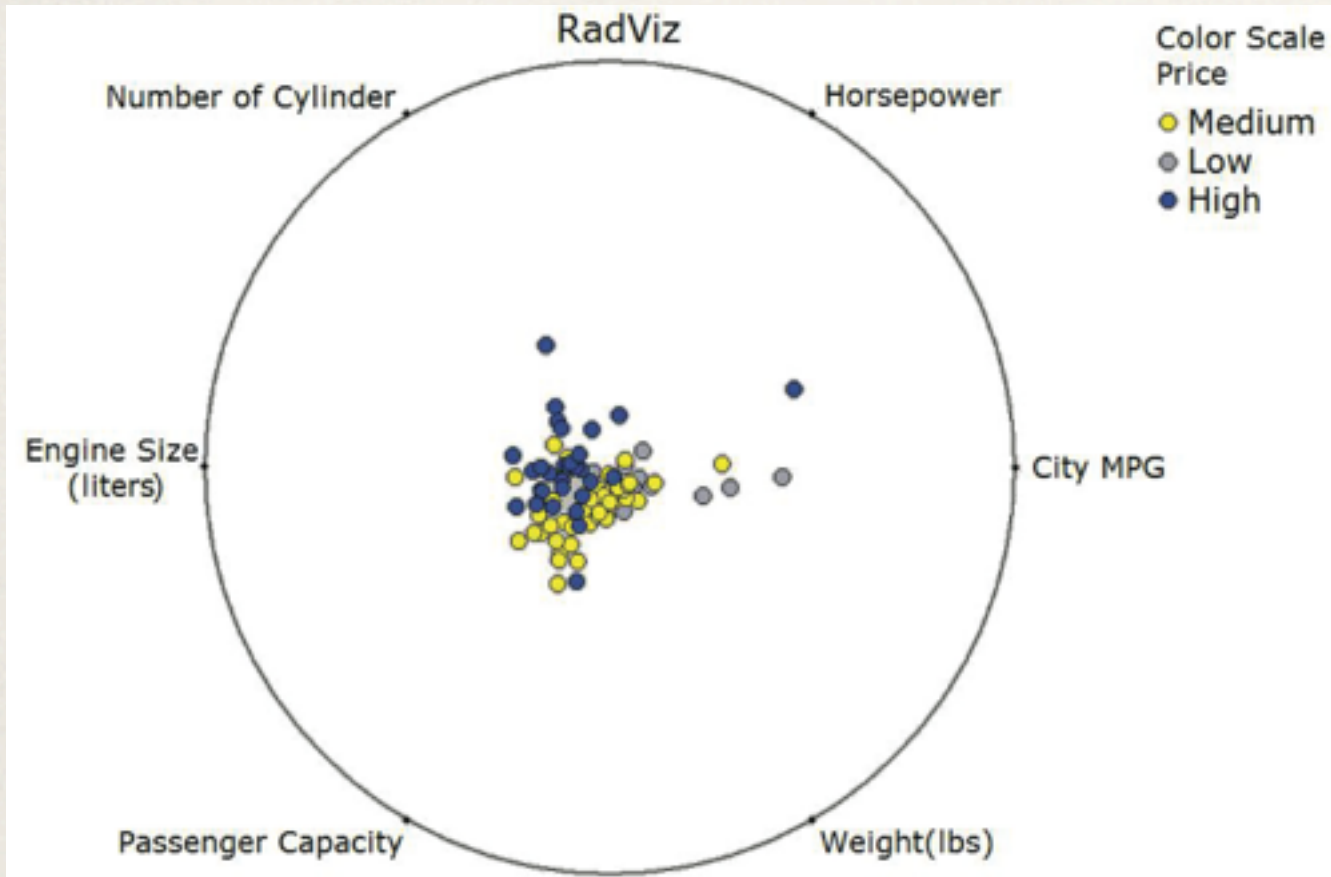
Yi, Melton, Jacko, Stasko, "Dust & Magnet: Multivariate Information Visualization using a Magnet Metaphor"

Dust & Magnet

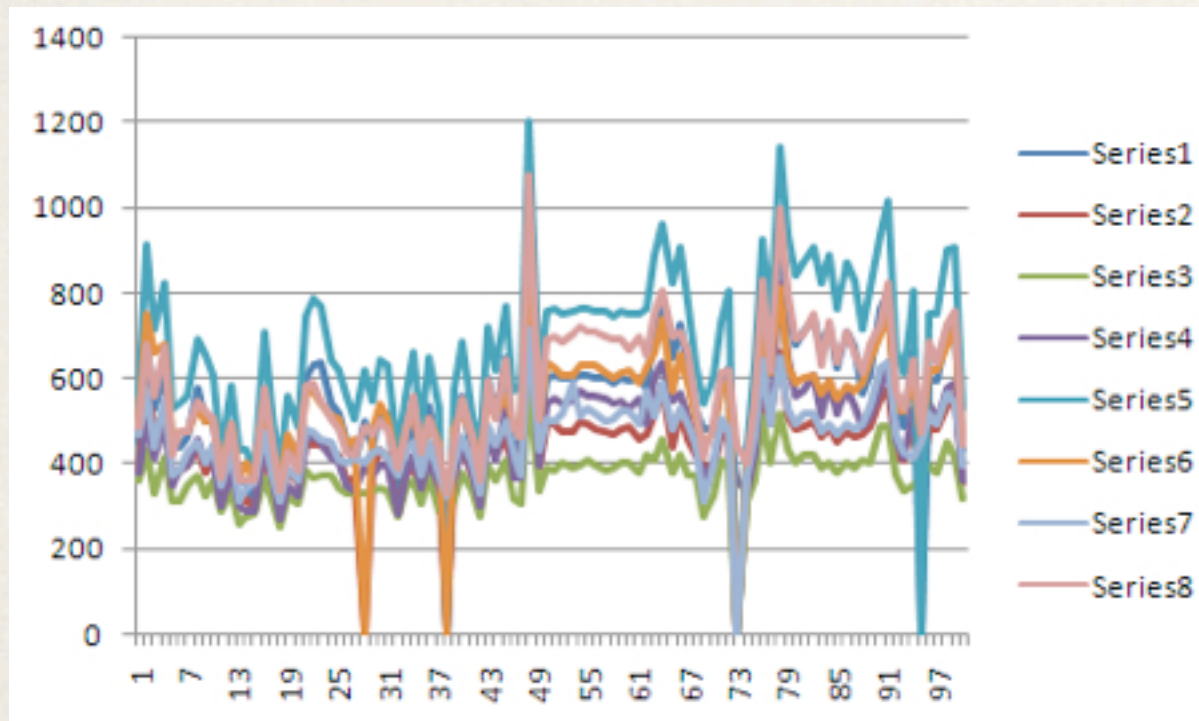


<http://www.cc.gatech.edu/gvu/ii/dnm/>

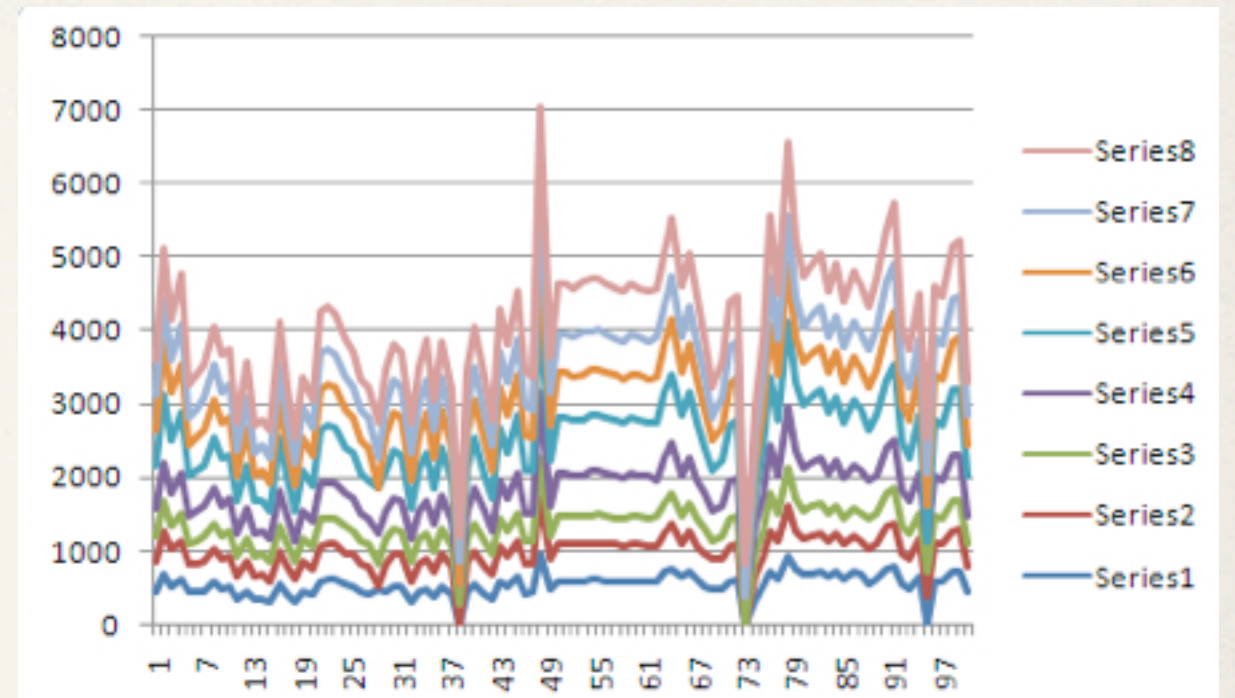
RadViz



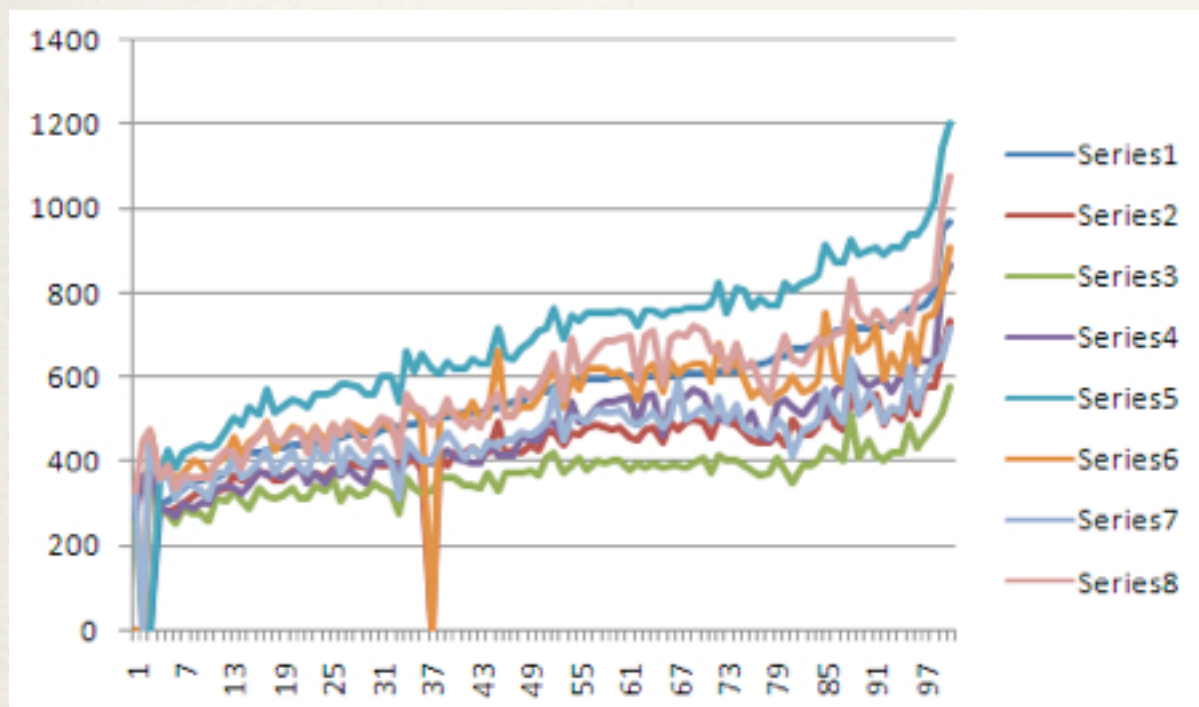
Line graphs



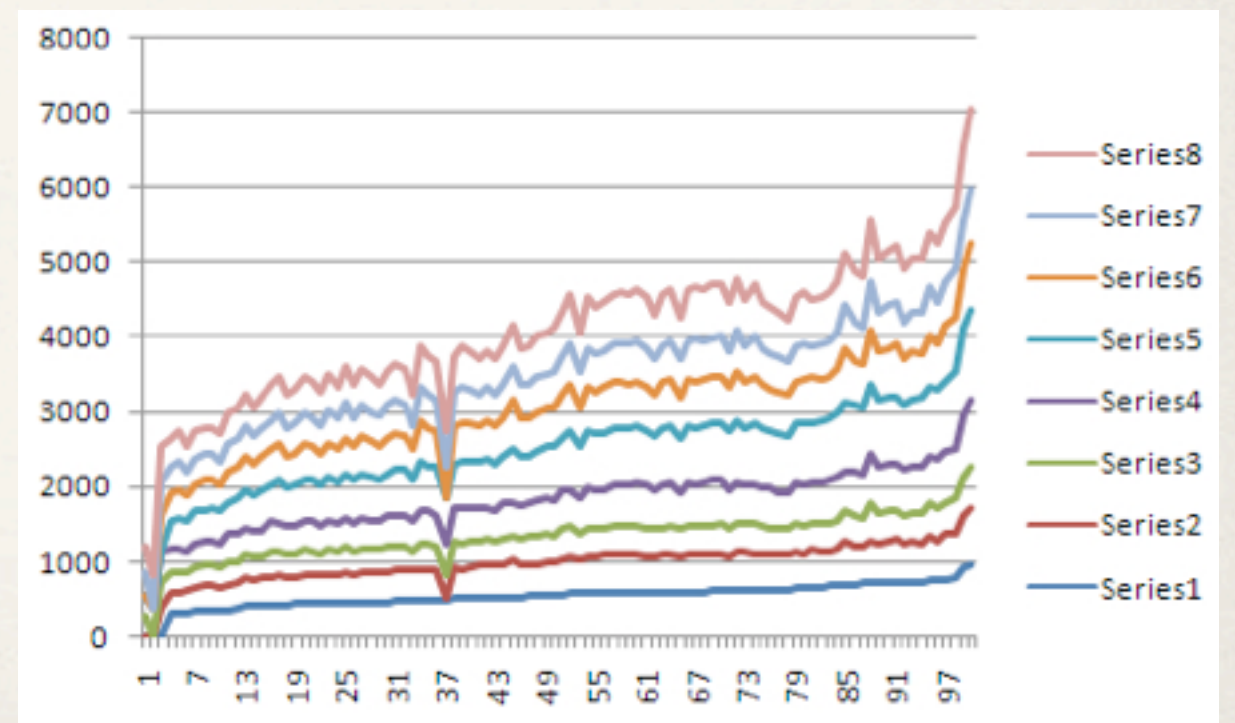
superimposed



stacked

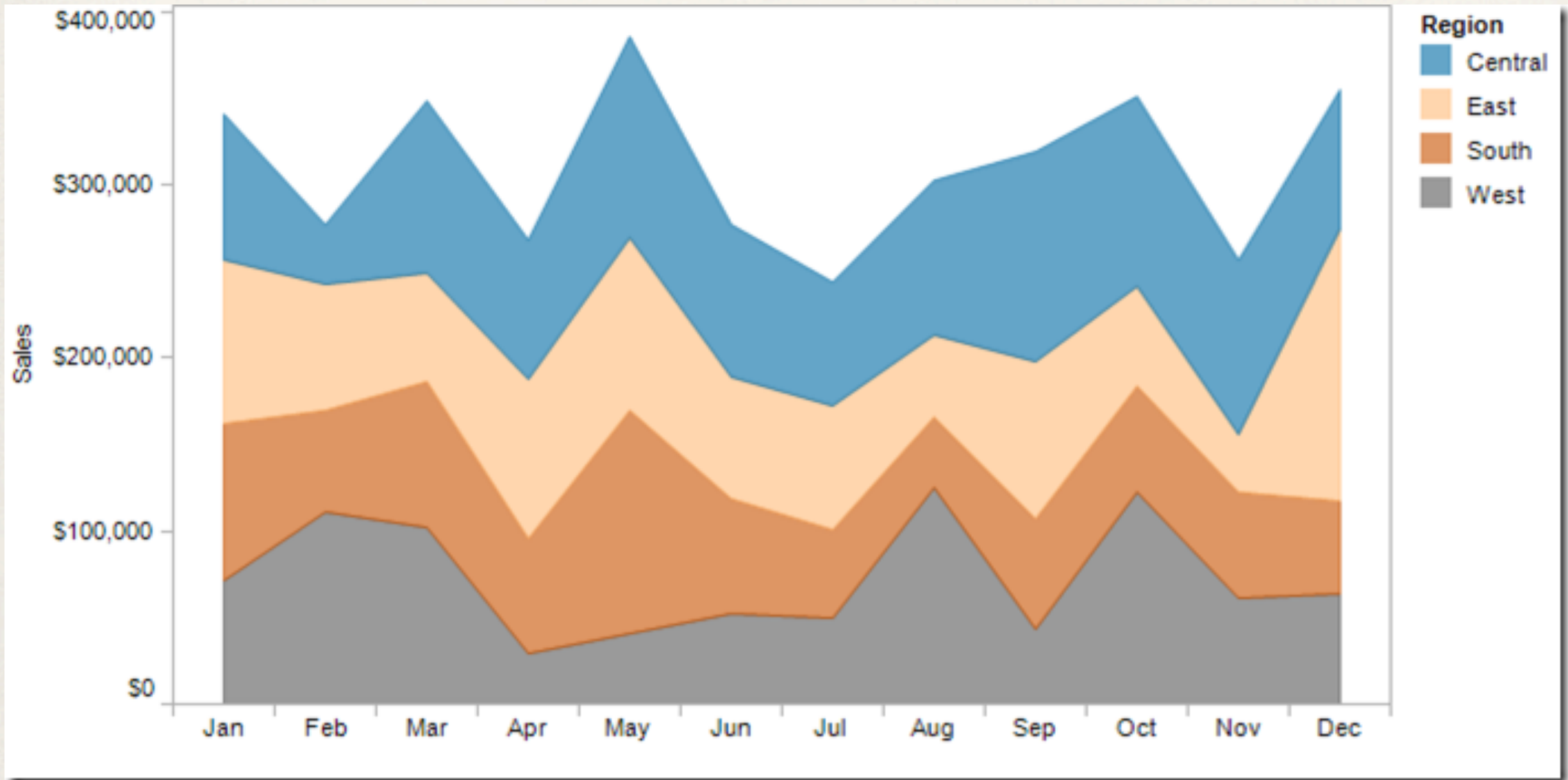


ordered superimposed

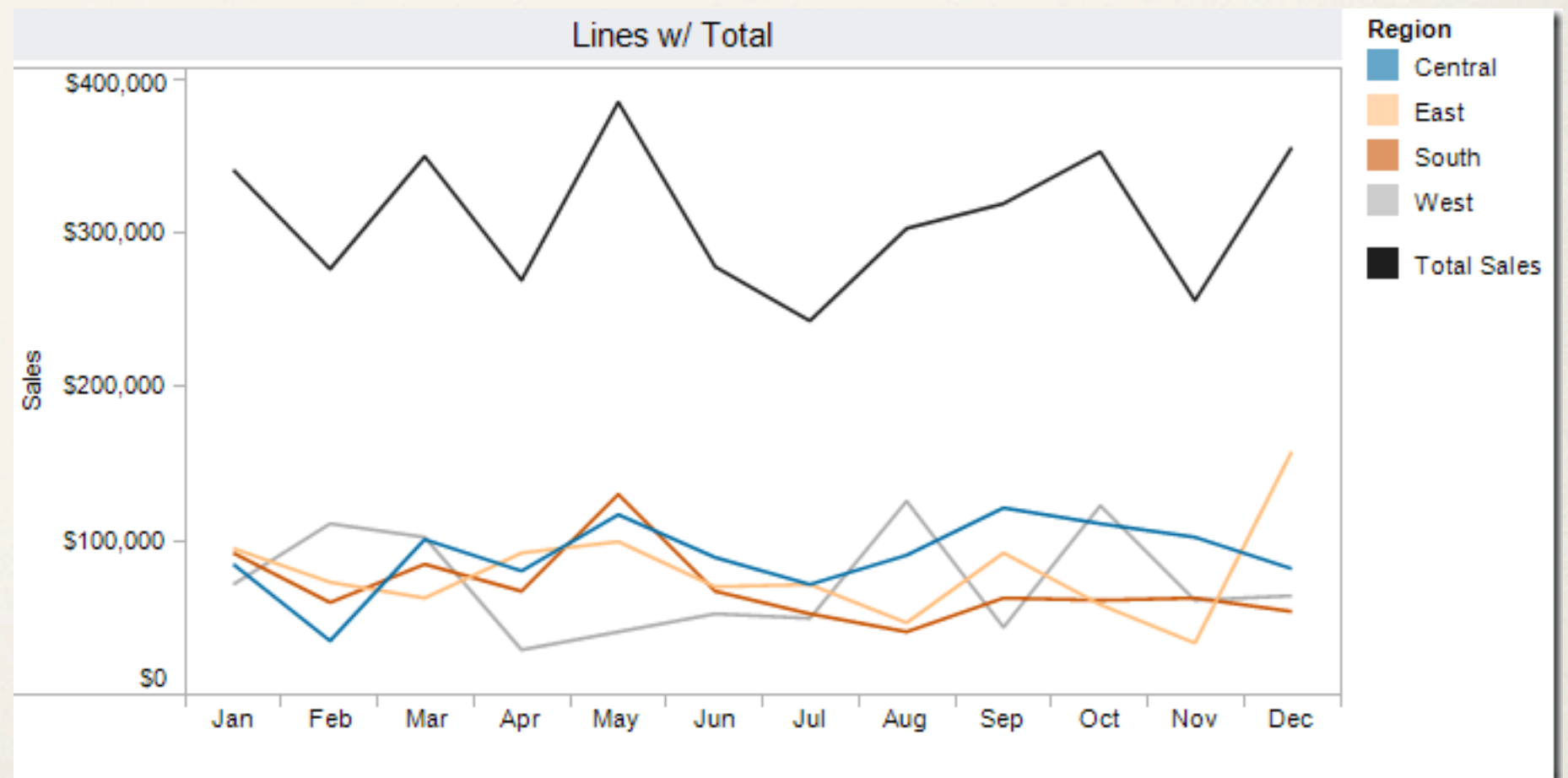
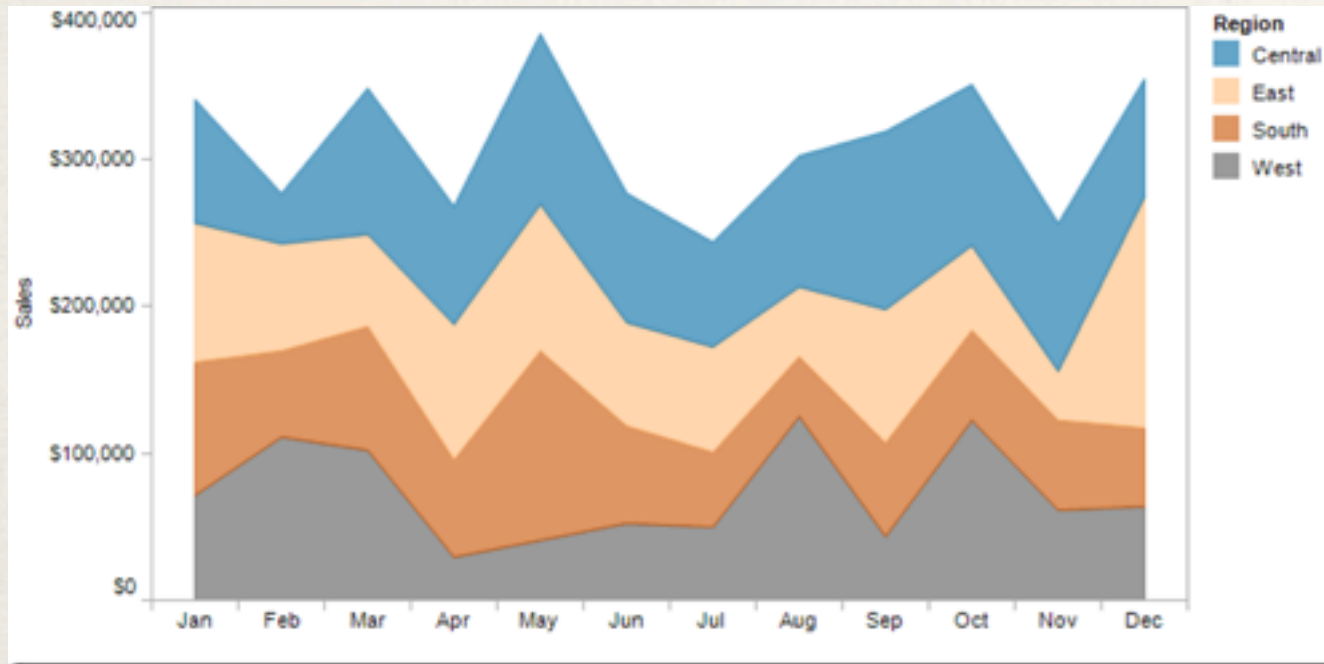


ordered stacked

Stacked area chart

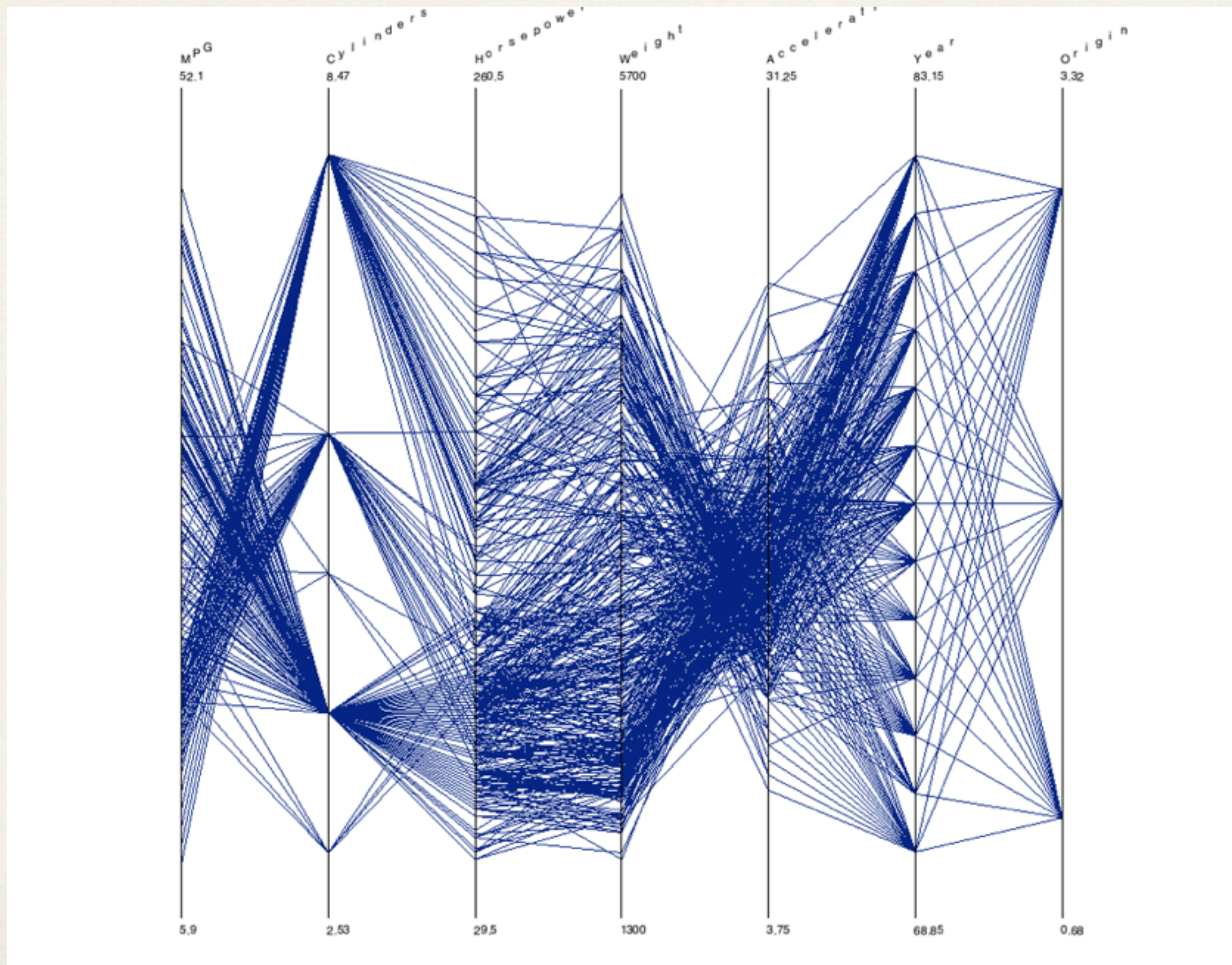


Stacked area chart

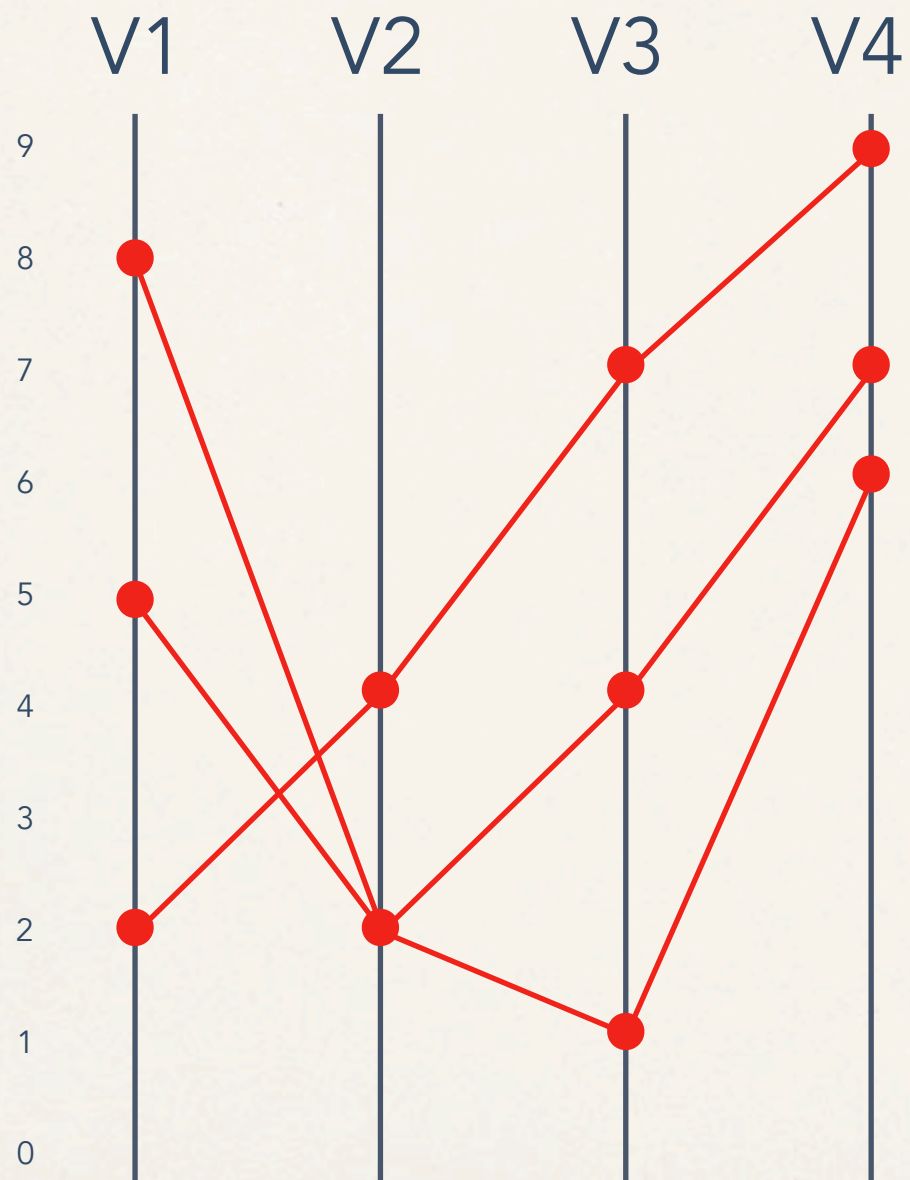


<http://vizviz.blogspot.com/2012/10/stacked-area-chart-vs-line-chart-great.html>

Parallel Coordinates



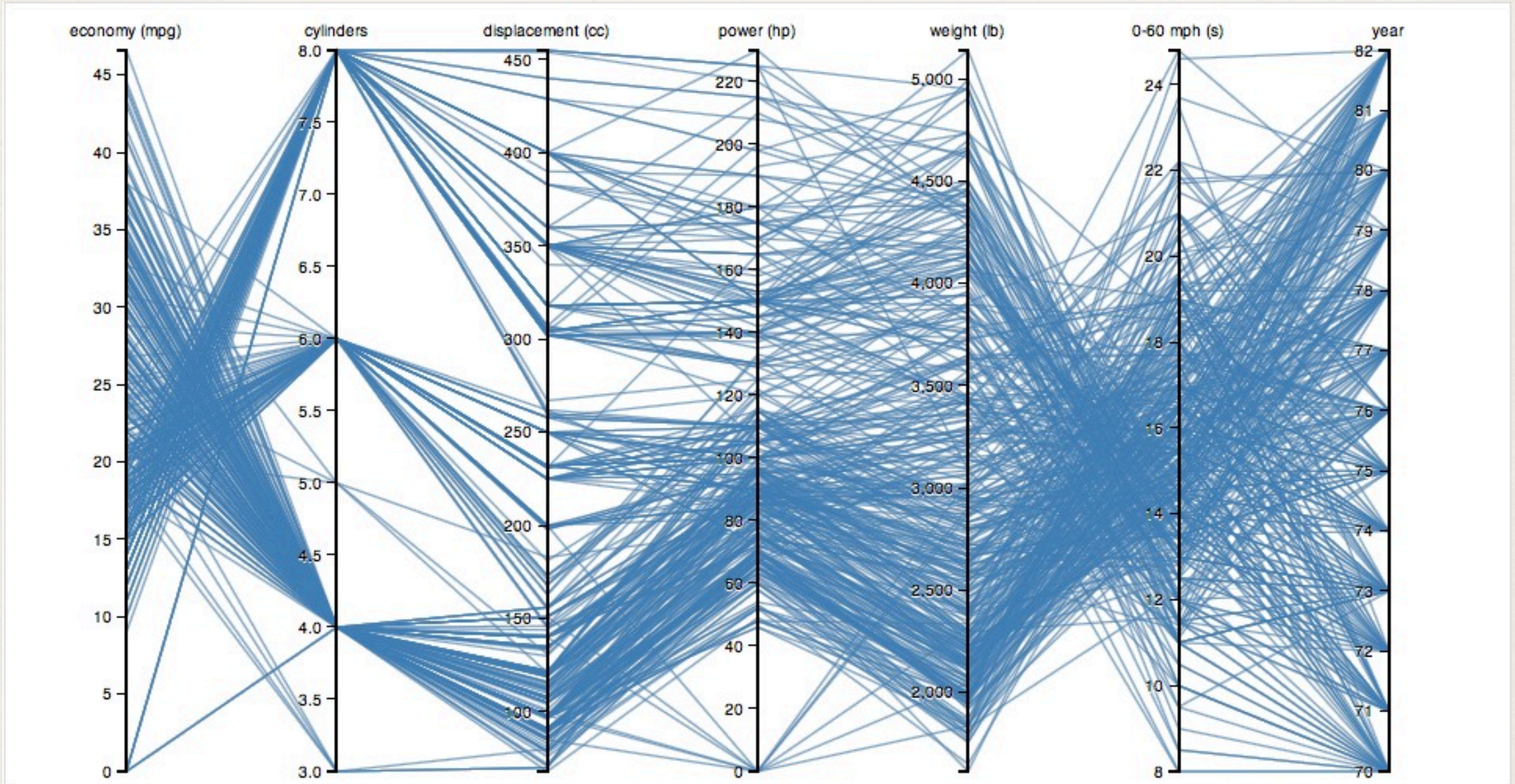
Parallel Coordinates



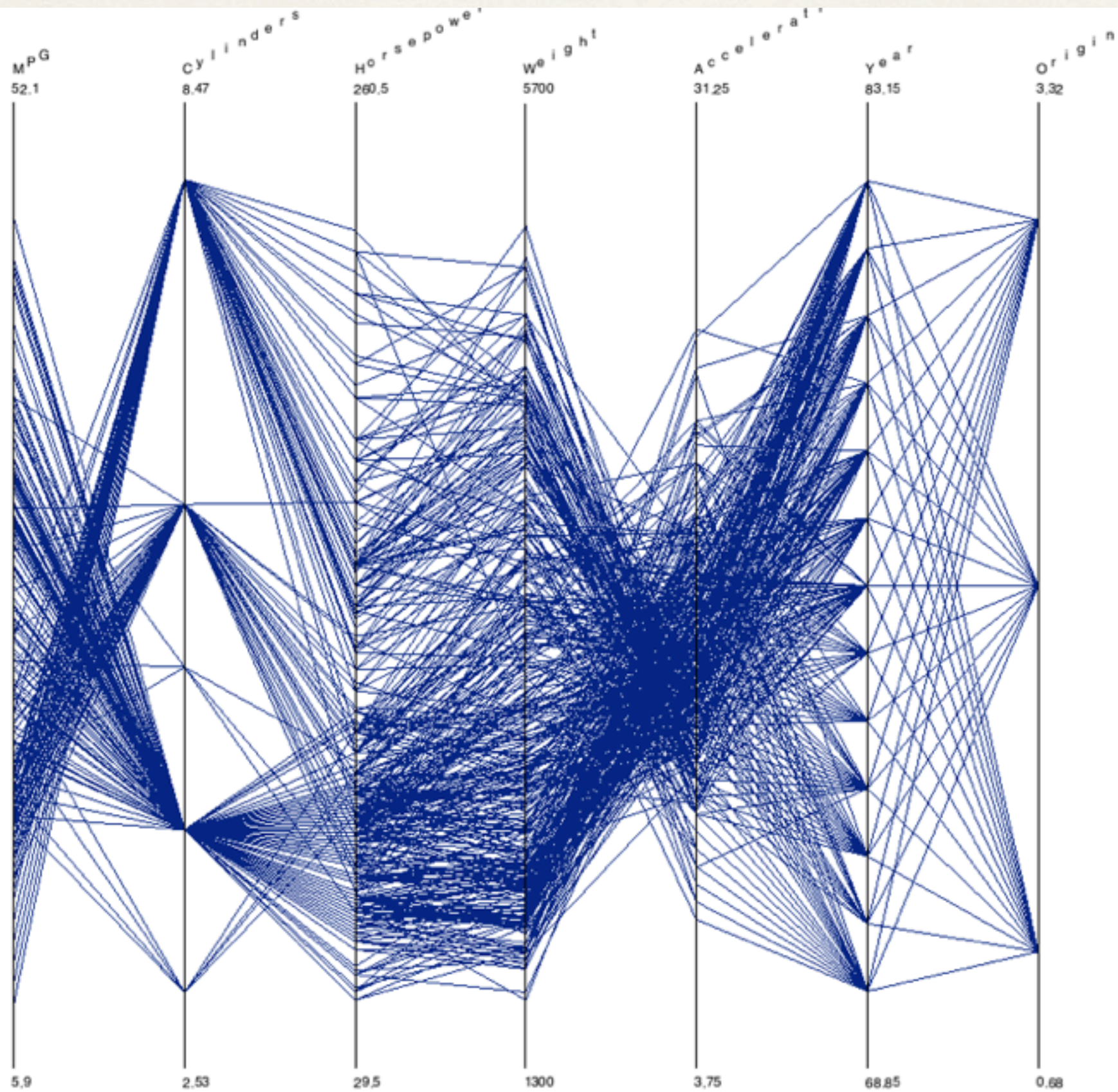
	V1	V2	V3	V4
D1	5	2	1	6
D2	2	4	7	9
D3	8	2	4	6

borrowed from J. Stasko

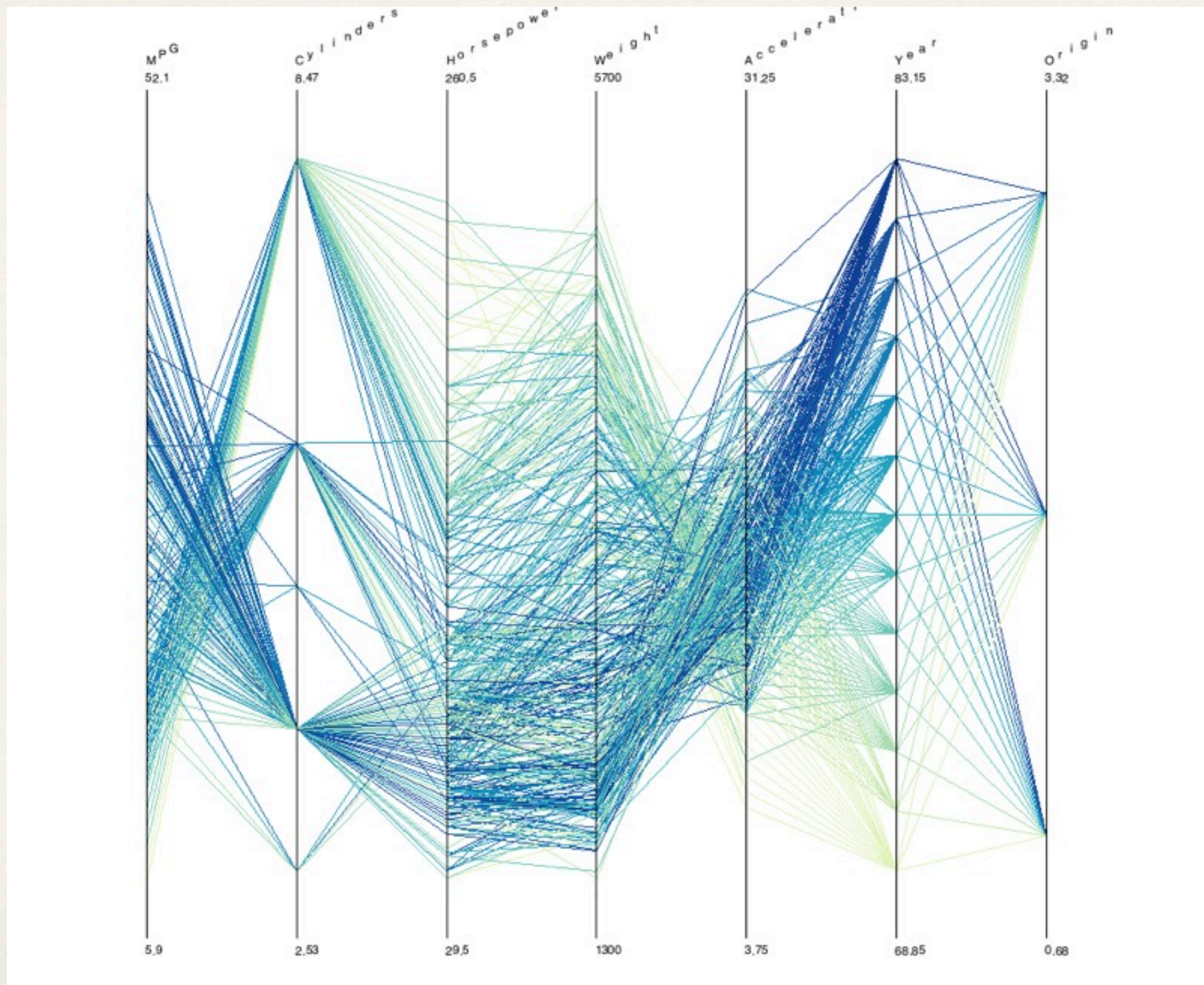
Parallel Coordinates in D3



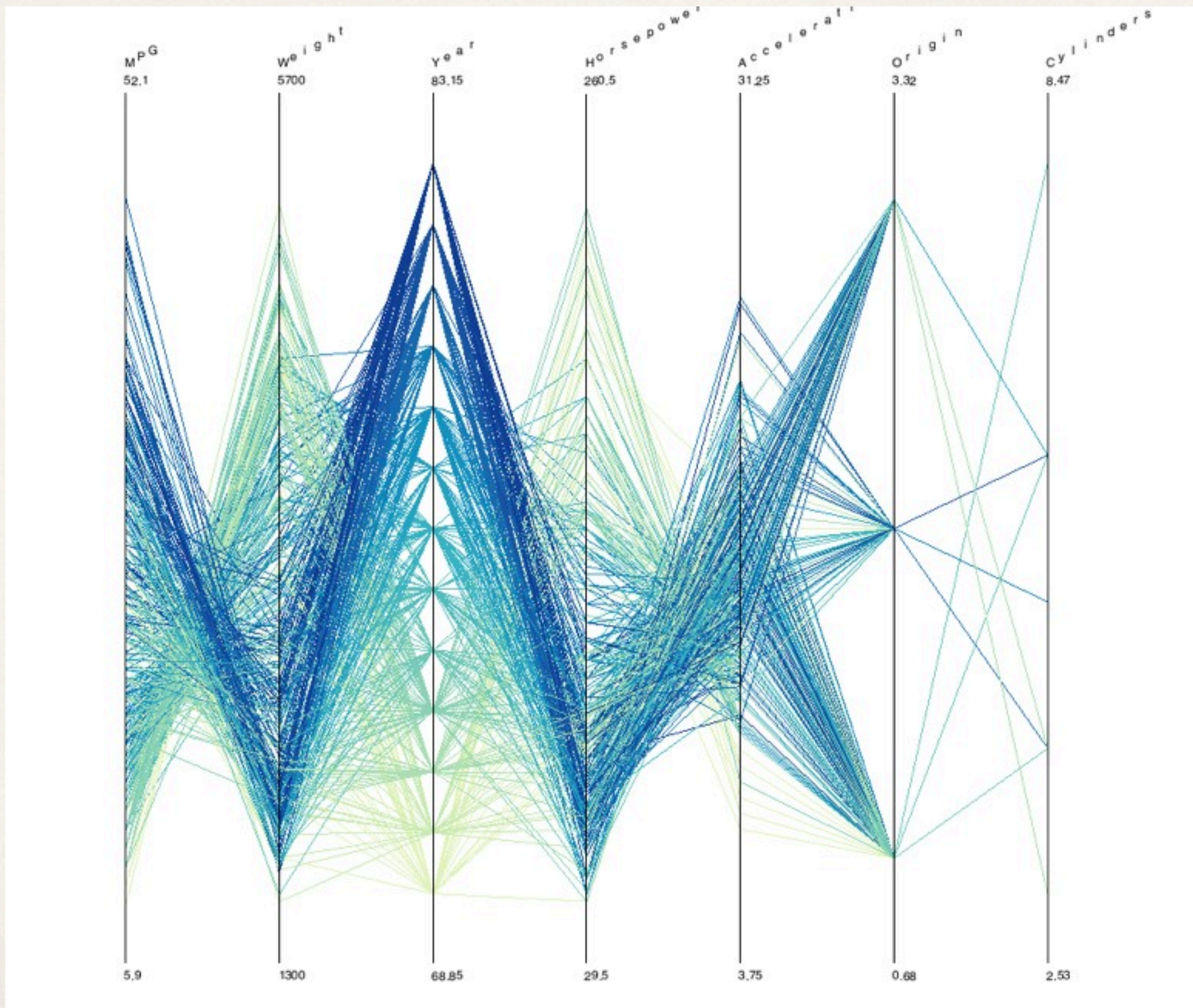
Parallel Coordinates



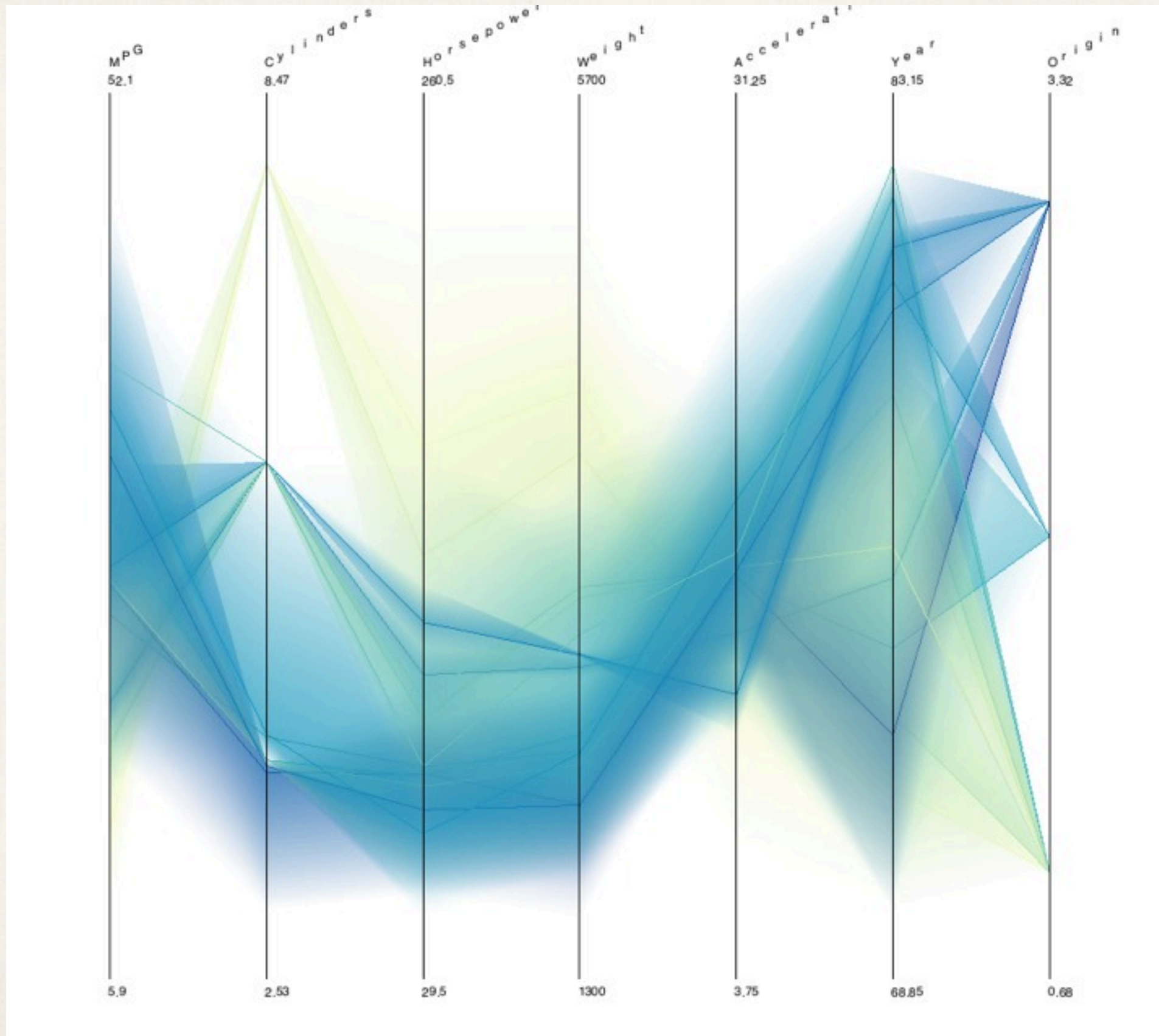
Parallel Coordinates



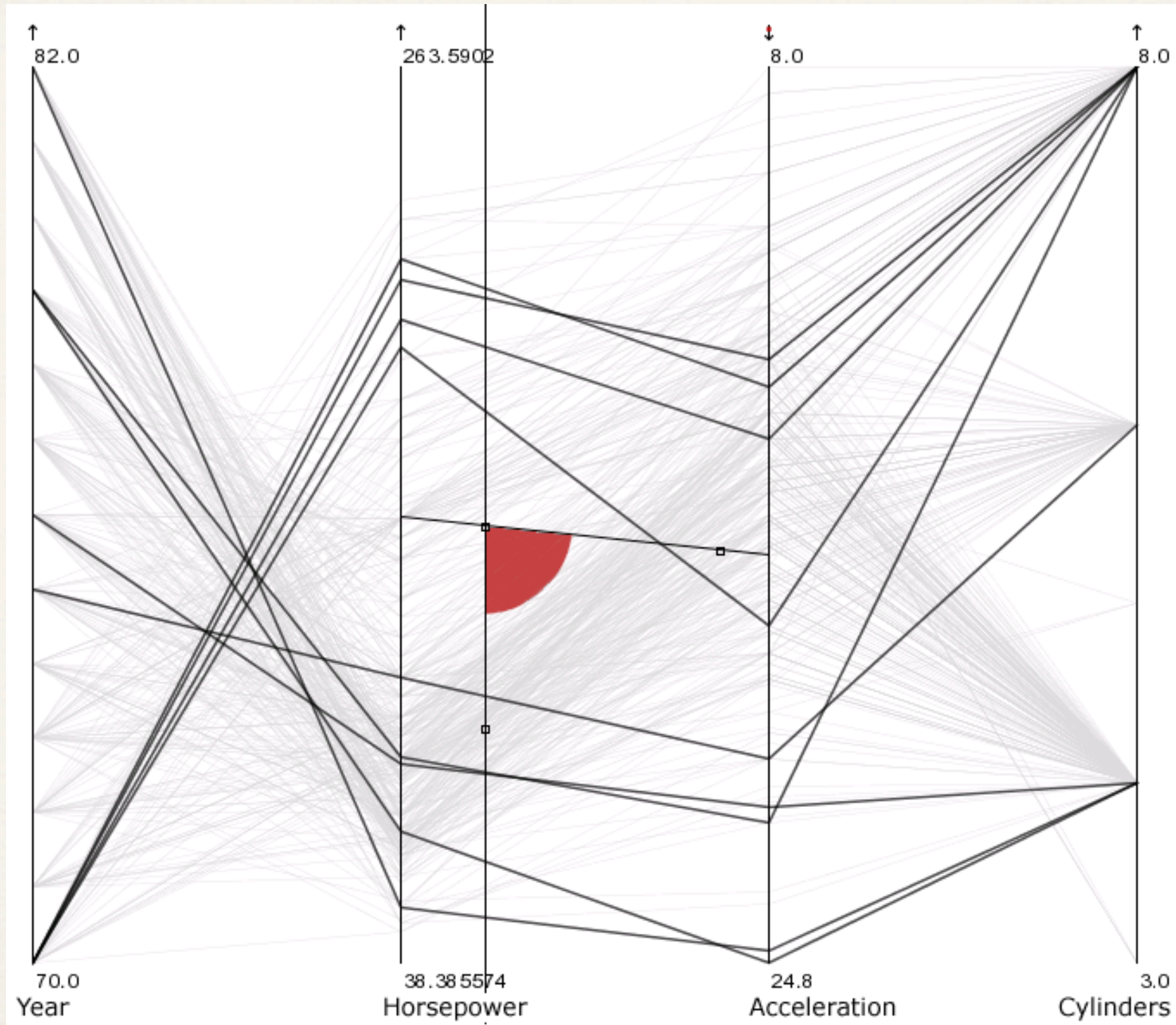
Parallel Coordinates



Clustering Parallel Coordinates

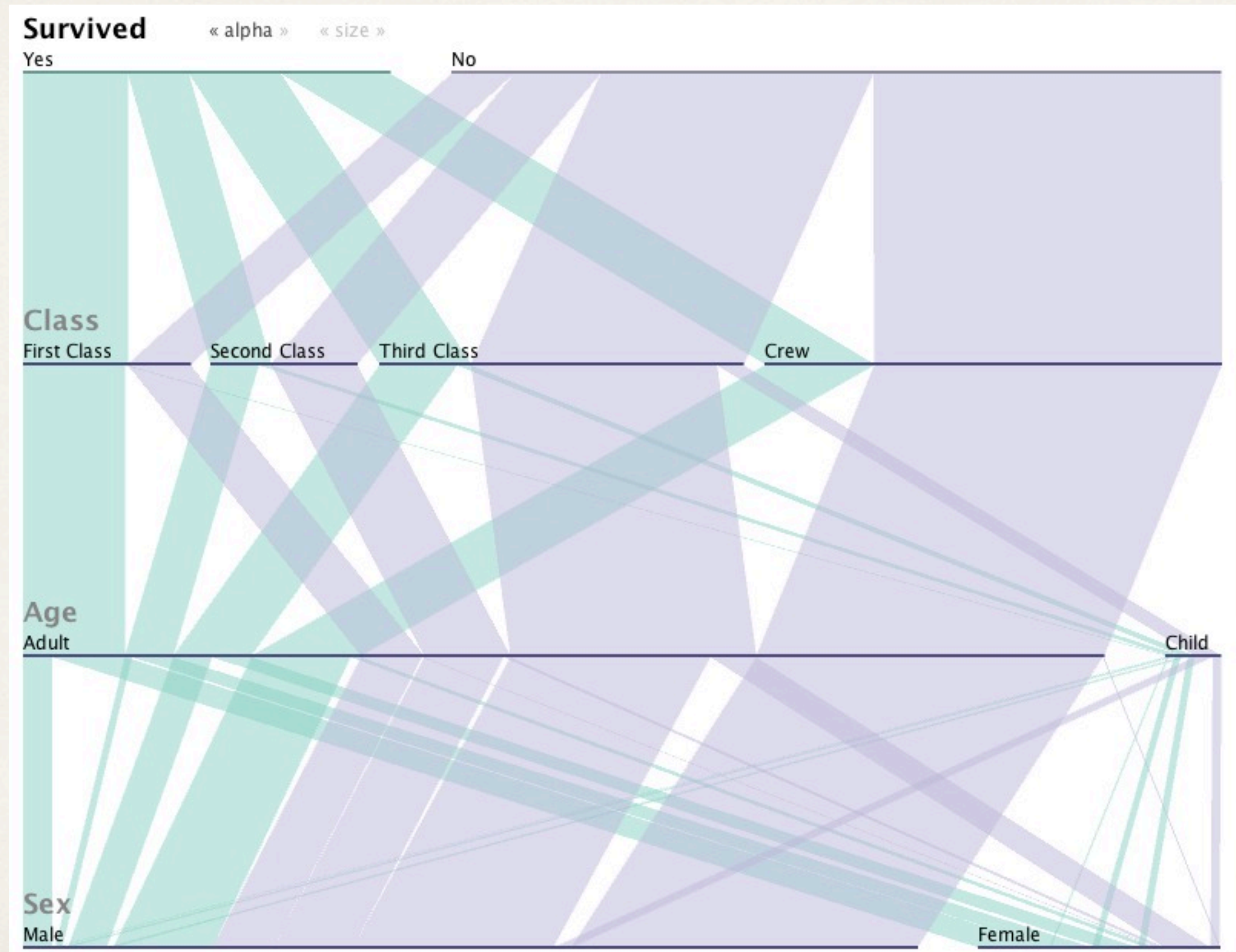


Angular brushing



Hauser et al. "Angular brushing of extended parallel coordinates"

Parallel Sets



Kosara et al. "Parallel sets: Interactive exploration and visual analysis of categorical data"

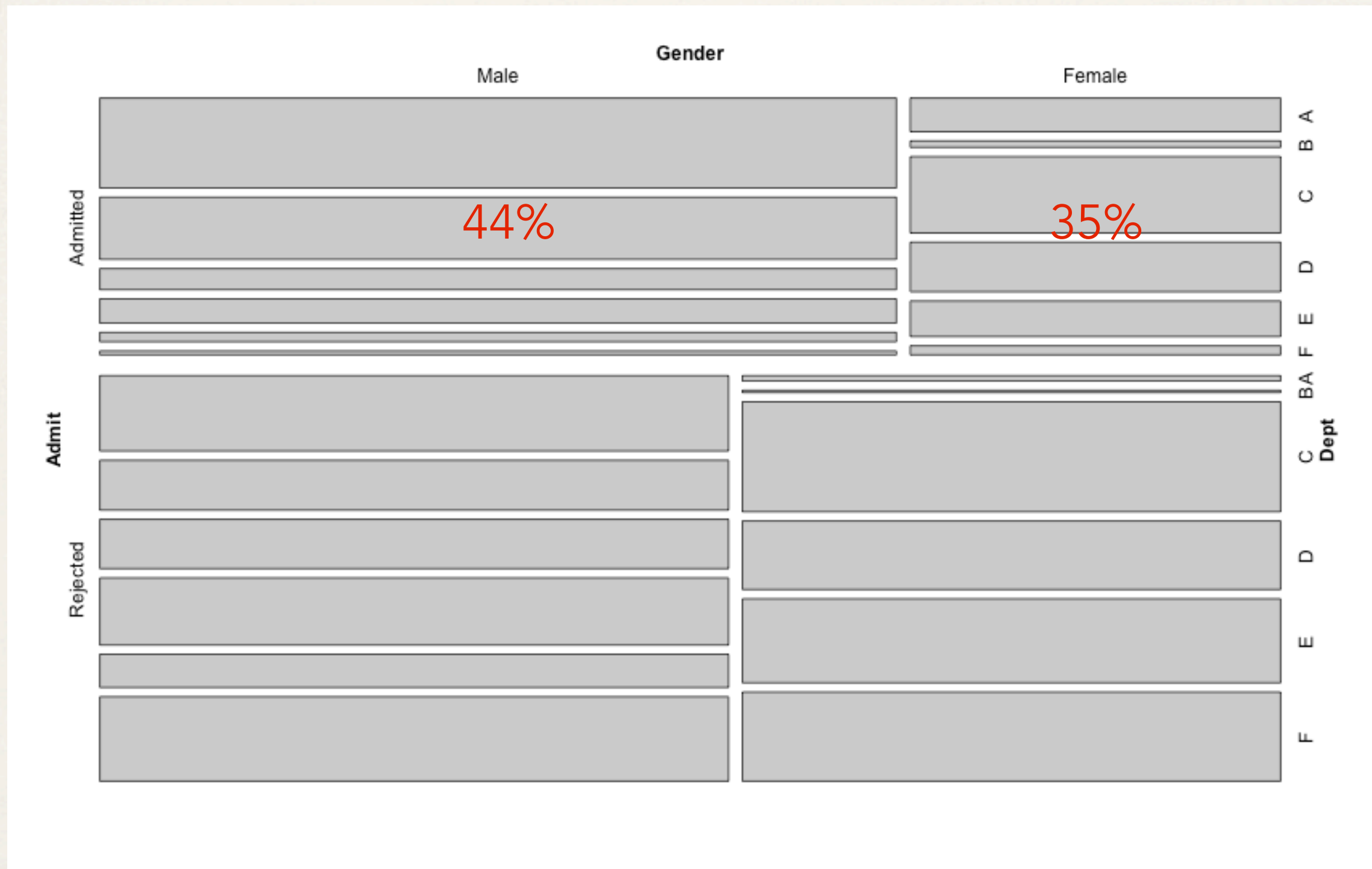
Mosaic plot (or Marimekko plot)



Mosaic plot (or Marimekko plot)



Mosaic plot (or Marimekko plot)



Aside: Simpson's paradox

